Can the Economic Impacts of Infrastructure Projects be Predicted? Economic Development Projects in the Appalachian Mountain Region

by

Jinevra R. Howard

Submitted to the Department of Urban Studies and Planning
in Partial Fulfillment of the Requirements for the Degrees of

Master in City Planning

and

Bachelor of Science

at the

Massachusetts Institute of Technology

June 2000

Signature of Author . . . . . .
Department of Urban Studies and Planning
February 14, 2000

Certified by . . . . . .
Karen R. Polenske
Professor of Regional Political Economy and Planning
Thesis Supervisor

Accepted by . . . . . .
Paul Smoke
Head of the MCP Committee
Associate Professor of the Practice of Development Planning

Can the Economic Impacts of Infrastructure Projects be Predicted?
Economic Development Projects in the Appalachian Mountain Region

by

Jinevra R. Howard

Submitted to the Department of Urban Studies and Planning
in Partial Fulfillment of the Requirements for the Degrees of
Master of City Planning and Bachelor of Science

ABSTRACT

I carried out a study of infrastructure projects in support of local economic development in a number of counties in the Appalachian Region of the United States in order to identify factors that influence the outcomes of such projects. Such information would help funding agencies decide how best to allocate their funding from the point of view of maximizing the economic impacts of the projects they fund. I compared 52 projects in terms of project type, economic impacts and efficiency of public funding, selected characteristics expected to be associated with successful projects, and population and employment growth in project areas. For the purposes of this analysis, I defined successful projects to be those with high job creation and retention impacts within each of three "scale groups" composed of projects with similar public-funding levels. I compared projects in terms of their scale groups, within each scale group in terms of their job impacts, and overall in terms of job impacts. The results indicate that water/sewer projects may tend to have higher job impacts than access-road projects, that projects that target high economic development potential areas and that remove bottlenecks to growth may tend to be successful, and that successful projects often take place in areas with positive rates of population and employment growth. The results also show significant differences in the efficiency of public spending between high- and low-success projects. This emphasizes the need for further efforts at identifying factors associated with project success.

Thesis Supervisor: Karen R. Polenske, Professor of Regional Political Economy and Planning

Thesis Reader: Karl Seidman, Lecturer

TABLES

Acknowledgements

I would like to thank Karen R. Polenske and Karl Seidman for their help in reading and commenting on this paper during its many stages. Their help was invaluable.

I would also like to thank Carlos Quintero for his suggestions and Michael Howard for his support and encouragement.

Chapter One
Introduction

The purpose of this paper is to evaluate local economic development projects consisting of infrastructure improvements with the goal of identifying factors that influence the outcomes of such projects.

Local Economic Development

Since the 1970s, local officials have responded to changes in the organization of the economy by targeting several strategies to promote economic development in their communities. The most general goal of local economic development efforts is to increase the local economy's capacity to create wealth for local residents, where wealth may refer to income from jobs, private and public goods and services (including the fiscal resources to pay for public goods and services), and quality-of-life factors. Common strategies of local economic development include attracting businesses, retaining and supporting the expansion of existing businesses, diversifying the local economy, and revitalizing or redeveloping older areas.

Local areas may face a number of underlying weaknesses that prevent economic growth, such as poor infrastructure, weak human capital, sectoral imbalances, lack of entrepreneurial activity, distance from large markets and production and service centers, weak institutions and social capital, and poor public-sector capacity to implement local development solutions. Depending on the conditions present in a particular local area, various underlying weaknesses present challenges with which local officials pursuing economic development must grapple.

The goal of local economic development projects is to overcome these challenges and to fulfill the community's economic development needs. In many cases local resources are insufficient to pursue the projects that are needed to forward economic development goals. Local officials can take advantage of regional, state, national, and private funding to supplement local resources. This funding comes from state and federal government and non-government agencies.

Most of agencies that contribute to economic development projects ultimately want to help generate sustainable economic development at the local level. To be sustainable, the future economic development of the area must not require a continual input of outside funding. Economic development therefore must stimulate sustainable private-sector activity, whether by attracting a new business that is likely to stay in the area, encouraging existing businesses to stay and expand in the area, or stimulating the growth and development of new businesses. Thus, many projects are focused on trying to attract new businesses to the area, encourage the growth of existing businesses, or foster the growth of new businesses. Infrastructure improvements are one way that local officials try to make the area more attractive for new and existing businesses.

Coverage of the Study

In this paper, I focus on economic development projects involving improvements in an area's stock of physical infrastructure. My goal is to identify factors that are associated with, and perhaps causally related to, the outcomes of

infrastructure projects. One of the important applications of this information would be to assist funding agencies in making allocation decisions about which projects to fund. It is important to consider this question of what makes infrastructure projects succeed or not succeed: a comparison of high- and low-success projects (discussed later in the paper) shows that, depending on the level of funding received by the project, successful projects can be up to 75 times as efficient as unsuccessful projects in their use of public funding. The goal of public funding is to improve society as much as possible while spending as few public dollars as possible, and the ability to predict project outcomes would allow funding agencies to generate more economic impact per dollar spent.

The projects that I discuss in this paper involve transportation, water, and wastewater infrastructure, as well as some site development for industrial parks. These types of infrastructure fall into Hansen's (1965) category of "economic" overhead and deal with what is sometimes called "economic infrastructure" (Currea and Polenske, 1985). In contrast to "social infrastructure" such as schools and hospitals, "economic infrastructure" directly supports private-sector economic activities.

Hirschman (1958) distinguished social overhead capital (SOC), generally provided and operated by the public sector, from directly productive activity (DPA) generated by the private sector. SOC delivers basic services that private production depends upon, such as transportation, public health, power, and education. The availability of transportation and power, most importantly, are

'preconditions' of development. (Hirschman 1958, Rockler 2000) Hansen (1965) distinguished between "economic" overhead, which supports directly productive capital and includes roads, bridges, power-generation projects, etc., and "social" overhead, which benefits society more generally and includes health, education and social welfare functions (Hansen 1965, Rockler 2000). Economic overhead capital can create benefits that private investment can take advantage of, creating the possibility for economic growth through investments in roads, power utilities, water systems, and so on. (Rockler 2000). However, additional investments in social or economic infrastructure are not productive once a region is 'congested', meaning that the marginal social productivity of any new DPA is negative. Public investment will create the appearance of capacity for more private investment, which will attract DPA; however, this DPA will increase the congestion of the area.

Infrastructure Economic Development Projects

Infrastructure projects in support of local economic development focus on providing adequate infrastructure for existing businesses to maintain their operations or to expand, or for new businesses to locate in the area. Infrastructure projects can also indirectly help solve sectoral imbalances by targeting infrastructure improvements to benefit a particular type of industry. Infrastructure projects in support of economic development may include site preparation for industry attraction, the building or renovation of roads, water or sewer lines, water or sewage treatment or storage plants, other utilities, or

facilities for business operations. In some cases infrastructure improvements are made to secure a prospective or planned private investment that is contingent on the area making the infrastructure improvement. In other cases, infrastructure projects are pursued with the more general goal of making the area more attractive for industry or businesses to locate. Another possible economic development function of an infrastructure improvement is to remove bottlenecks that constrain an area's growth.

Physical infrastructure is an important component of an area's capacity for economic development. The importance of physical infrastructure can be looked at from a number of perspectives. From the point of view of business location theory, infrastructure can either support or detract from the attractiveness of an area for private investment. Studies of the relationship between public investment in infrastructure and economic growth have often considered physical infrastructure as an input into the production processes of businesses, affecting the cost of production and thus the profit margin of businesses (Rockler 2000). Although this relationship is still not well understood, adequate public infrastructure is recognized as contributing to the productivity of local firms as well as to overall economic growth (Blair 1995).

Public infrastructure can also be considered in terms of its contribution to external economies, such as localization and urbanization economies. Localization economies refer to the cost savings of related firms that utilize the same infrastructure improvement. For example, a project that services a wood-industry industrial park would be contributing to localization economies. Urbanization economies are defined as "cost savings that accrue to a wide variety of firms when the volume of activity in an entire urban area increases."

(Blair 1995) Blair calls urbanization economies "the most diffuse type of agglomeration economies." Infrastructure that makes a place more attractive for businesses may begin to attract new businesses. As more businesses are attracted, the per unit cost of maintaining the infrastructure decreases due to economies of scale. It can be argued that without an initial stock of infrastructure, economies of scale can never be reached and economic growth may be unable to sustain itself. Although the precise impacts of infrastructure on economic growth are difficult and perhaps impossible to measure, it is clear that infrastructure is a necessary component of a stable and healthy economy.

Funding for Local Economic Development Projects

The responsibility for building and maintaining local physical infrastructure is almost always in the hands of the local government. The fiscal resources of many areas are inadequate to make needed infrastructure improvements, and local governments often rely on outside funding to supplement their resources in support of infrastructure projects.

Every year many potential infrastructure projects in support of economic development are in need of funding from state, regional, private, and federal sources. In the United States, the Economic Development Authority (EDA) and the Appalachian Regional Commission (ARC) are two of the largest agencies that help fund local development projects. The EDA was established under the Public Works and Economic Development Act of 1965. Its goals are to generate new jobs, help retain existing jobs, and stimulate industrial and commercial growth in economically-distressed areas of the United States. The ARC was established under the Appalachian Regional Development Act in 1965 to support

economic and social development in the Appalachian Region. Its mission is to help residents of Appalachia to create opportunities for self-sustaining economic development and improved quality of life. Both the ARC and the EDA have public works and infrastructure programs that provide partial funding for local infrastructure and public works projects. While the EDA specifically funds projects tied to local economic development, the ARC also funds infrastructure projects with primarily residential, quality-of-life goals.

Funding agencies such as these want to put their money into the most productive use, so that they need some way of making a reasonable determination of what projects are likely to be successful. How do we look at projects that are up for consideration and decide which ones are likely to be successful?

Expected Findings

There are several factors that I would expect to affect the level of success of local infrastructure projects in support of economic development. A project is more likely to be successful if it clearly articulates a strategy for fulfilling recognized economic needs of an area, such as recruiting a particular business or type of industry, removing bottlenecks to growth, or targeting an area with high economic development potential. The more specifically local officials can articulate the economic development strategy that they are pursuing, the more focused they can be in their efforts to meet these needs.

An area's strategy for fulfilling its economic needs through a particular project might consist in trying to attract a certain type of industry or a particular business. Projects that are implemented in order to enable a private investment

that is contingent on the infrastructure improvement, or that at least have in some way committed to the area, would tend to be more successful than projects that pursue vague goals of making the area more attractive to industry without having a "bird in hand." For example, a business may agree to locate in an area as long as the sewer lines are extended to serve the prospective site of their facility. In this case, completing the necessary improvement is likely to be successful in terms of its economic development aims. A project with more general goals, such as to increase the attractiveness of the area for industry without having any specific businesses or even a particular type of industry in mind, is less likely to achieve its economic development goals.

An area's economic development strategy might also include projects to remove specific bottlenecks that are constraining economic growth. If there are one or two bottlenecks to the growth of an area, a project that removes the remaining bottlenecks to growth is likely to be successful. However, a project may make a needed infrastructure improvement and still not meet its economic development goals if other infrastructure improvements still need to be made, or other challenges still remain that inhibit economic development in the area.

A project is more likely to be successful if it is implemented during a period of economic growth in the area. If the population is growing, businesses may be more likely to respond to a project's efforts to improve the area, because of the availability of labor and/or increasing market size. Also, the sales of existing businesses may increase due to the larger market size, perhaps encouraging these businesses to expand.

A project may be more successful if the industrial sector the project is targeting is growing in number of establishments, number of employees, or

income/output during the time of project implementation. This may give the area the appearance of a good place for that type of industry to locate their operations in. Additionally, a project may be more successful if other sectors are growing that support or link into the sector being targeted.

Chapter Two
Evaluations of Local Economic Development Projects

Agencies that fund economic development projects often conduct evaluations of these projects in order to assess the impacts that their funding has had.

Purpose of Evaluations

Evaluations of economic development projects can serve two general purposes for funding agencies. One of the main purposes that evaluations of economic development projects serve is to justify the existence of an organization that is accountable for the projects' outcomes. Potential projects compete for funds from funding agencies, but funding agencies are often dependent for their funds on other sources, public and private. An evaluation of projects that an agency contributed to may provide evidence that the agency's funding is serving a valuable purpose, and this may be used as an argument by that agency that they should continue to receive their funding. The other main purpose that evaluations of economic development projects serve is to improve future internal decision-making of funding agencies. A funding agency can use information about outcomes of past projects and how these projects were implemented to make adjustments to its policies and programs so as to make them more effective in achieving that agency's goals.

As noted earlier, efficient use of agency funding would be greatly facilitated if there were a method for predicting which projects are likely to be

successful. Thus, the question of what factors influence the economic impacts of local economic development projects is important. Evaluations of local economic development projects have the potential to provide insight into the relationship between infrastructure and economic development and to assist in understanding what factors influence the outcomes of infrastructure economic development projects.

Shortcomings of Evaluations

Evaluations often focus on assessing the economic impacts of infrastructure projects without inquiring into the reasons that some projects are more successful than other projects. Evaluations are generally focused on determining the impacts of an agency's program, which has contributed to a number of projects. The evaluations tend to focus on limited aggregate indicators, such as the total number of jobs created by all projects funded by a program. When evaluations are pursued as a means to justifying the need for future funding of an agency, they may focus on a limited number of indicators that show the greatest overall impacts of the agency's program. Furthermore, it may not be desirable to compare individual projects with one another when they were both funded by the same agency. Local officials, as well as officials within funding agencies who make decisions about which projects to fund, would benefit from some insight into what makes some projects succeed and others not succeed. There is often a limitation of resources, such as inadequate information about projects, project areas, and project outcomes, or a lack of sufficient funding to conduct a thorough evaluation.

Examples of evaluations that are done to assess the impacts of economic development projects or programs are common. For example, Bingham and Bowen (1994) conducted an impact evaluation designed to verify empirically whether state economic development programs accomplish what they are designed to accomplish. Isserman and Rephann (1995) conducted an evaluation of the economic impacts of 26 years of the Appalachian Regional Commission (ARC) program that was designed to accurately assess what portion of the improvement in income and other indicators in Appalachian counties was actually attributable to the investments ARC had made in the region. Funding agencies such as the ARC and the Economic Development Authority (EDA), and international agencies like the International Monetary Fund and the World Bank, conduct internal evaluations to determine the impacts of their programs, as well.

The World Bank has been perhaps the most important international institution in terms of investigating what influences the success or failure of development projects (Jenkins 1997). According to Jenkins, the World Bank has conducted studies that identify at least least two determining factors in project performance. First, Jenkins described a study that showed that the quality of economic analysis done to evaluate projects before they are implemented is highly correlated with the actual performance of the project: that is, low quality economic analysis is associated with unsatisfactory project performance, though a causal relationship is by no means clear. The other determining factor identified by World Bank research, according to Jenkins, is that of macroeconomic stability in project countries. The research consisted in comparisons of development projects in many different countries, and the results showed better performance for projects in countries with greater macroeconomic

stability. This information would not help agencies such as the ARC and the EDA make decisions about how to allocate funding among potential projects, however. There remains a need for evaluations that pursue as their primary focus this question of what factors influence the outcomes of local economic development projects.

One way to evaluate local economic development projects with the goal of helping local officials and funding agencies make future determinations about which projects are most likely to succeed, is to look at past projects that were successful and to try to find out why they were successful. Given limited information about the projects and their outcomes, I examined the available data and tried to identify common characteristics of successful projects. In order to conclude that common characteristics of successful projects may be causally related to (rather than just correlated with) project success, I also compared less successful or unsuccessful projects. Common characteristics of successful projects should be consistently lacking in unsuccessful projects, or opposite characteristics to those found in common among successful projects should be found in common among unsuccessful projects, in order to conclude that the common characteristics identified in the comparisons are among the factors affecting project outcomes. I stress, however, that even perfect correlation cannot guarantee the presence of causality between factors.

Recent Evaluations of Infrastructure and Public Works Programs

In the early 1990s the EDA commissioned an evaluation of their Infrastructure and Public Works program (Evaluation of the U.S. Economic Development Administration's Public Works Program, 1992). The main goal of

the evaluation was to assess the impacts of EDA's program. However, it also included an attempt to identify factors that influenced project outcomes. The consultants who implemented the study concluded that the available quantitative data only explain a small proportion of what distinguishes successful from unsuccessful projects.

There are a few possible reasons for this. First, the primary emphasis of the evaluation is on assessing the impacts of projects; identifying factors that influence the impacts of individual projects was a secondary goal and may not have received sufficient attention. Second, the scope of the evaluation may have been too large to pursue this type of analysis: the 233 projects that were evaluated were implemented in all six of the EDA regions, which cover the entire United States. Projects in widely different geographical regions with very different economic backgrounds and histories may be too diverse to yield any useful comparisons. Third, the evaluation considered a range of measures of project impacts. Although this approach avoids an overly narrow conception of project success, it does not consider the possibility that different factors influence different individual outcomes of economic development projects. For example, there may be factors that influence the success of projects in terms of job creation and separate factors that influence the success of a project in terms of the number of businesses it serves or whether it reaches its projected capacity. Considering project outcomes according to multiple and broad measures of project success may make the process of identifying specific factors that influence the outcomes more complex and difficult. If a provisional, restricted definition of project success is used to rank projects, and then projects are

compared according to this ranking, it may be possible to identify characteristics of projects that perform well on that particular measure.

In 1999, the ARC also commissioned an evaluation of its Infrastructure and Public Works projects (Evaluation of the ARC's Infrastructure and Public Works Program, 2000). Like the EDA evaluation, the ARC evaluation assessed project outcomes along a range of economic measures. The ARC evaluation covered projects in the Appalachian region; thus, it had a more focused geographical scope of inquiry than the EDA evaluation. However, the ARC evaluation did not inquire into what factors influence projects' outcomes, but rather focused on assessing the impacts of the ARC projects.

Neither the ARC nor the EDA evaluation distinguishes between projects of different scales for purposes of comparison. Both evaluations evaluated different types of projects separately, according to their own classification scheme. However, large projects and small projects are likely to succeed or fail for different reasons. If the aim of an evaluation is to identify factors that influence project success, projects of widely different scales should be analyzed separately.

Role of This Study

My paper fills the gap that I saw in evaluations of economic development projects involving physical infrastructure. I saw a need for an evaluation that focused on identifying factors associated with project success, while limiting the scope of projects to a relatively small geographic area. Although what distinguishes a successful project from an unsuccessful project may be a combination of multiple factors, difficult to separate and identify, the importance

of understanding what makes projects succeed or fail demands that more careful, extensive inquiry be made into this question. By comparing individual projects of similar scale (level of funding) and within a geographical region which, though not homogenous, does bear some internal similarity, I hoped to identify common characteristics of successful projects that might have some explanatory power regarding the projects' outcomes.

Chapter Three
Data and Methodology for Evaluating the Success and Failure of Local Economic Development Projects

The legislation that authorizes the ARC defines the Appalachian Region as a 200,000-square-mile region in and around the Appalachian Mountains, stretching from southern New York to northern Mississippi. The Appalachian region includes all of West Virginia and parts of Alabama, Georgia, Kentucky, Maryland, Mississippi, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, and Virginia. About 22 million people live in the 406 counties of the Appalachian Region; 42 percent of the Region's population is rural, compared with 20 percent of the national population. The extraction of natural resources (timber and coal) and manufacturing (largely wood products and textiles) were the early economic activities in the region. Economic activities in the region have diversified in recent years, including more emphasis on services and the development of tourism in some areas.

ARC goals have also shifted since its inception, however the provision of infrastructure remains important in its programs. ARC's early programs focused on improving accessibility in the region; in particular, the major portion of early ARC funds went into building a highway system through the Appalachian region to connect it with the interstate highway system. ARC also funded many health and education programs, and improved local water and sewer infrastructure in many communities.

In 1999, the Brandow Group in Pennsylvania and the Economic Development Research Group (EDRG) in Boston, MA conducted an evaluation of infrastructure projects that received part of their funding from the Appalachian

Regional Commission (Evaluation of the ARC's Infrastructure and Public Works Program, 2000).

Methodology

The evaluation focused on 99 projects involving infrastructure and public works improvements that were implemented in the early to mid 1990s. I analyzed a subset of these projects with the aim of determining what factors affected whether a given project was more or less successful.

Exclusion of Projects From Original Database

Starting with a data set of 99 projects developed by the author and other consultants at EDRG, I excluded a number of these projects from the data set for my analysis, in order to focus on projects with economic development goals. I also excluded projects that had not been completed by 1997 in order that a few years had passed for the project's short-term effects to be seen. I have interviewee responses to the question of "What community needs was this project designed to fulfill?" I used these responses, which ranged from specific goals to replace jobs lost from a company closure to more general job creation and "economic and community development" needs, to determine which projects had economic development goals. Thus, I excluded projects with responses such as "public health," "community development," or "need to provide clean water for residents." I also excluded business incubator projects, in which industrial space was constructed or renovated to serve new or small businesses. In general, these were at such a different scale from the other projects that I would have had difficulty comparing them to the other projects,

which consisted predominantly of water system, sewer system, and road improvements. In addition, only about four of the business incubator projects had specific job-creation goals (the others were mostly designed to provide more affordable industrial space and/or business support to new and small businesses, or to redevelop brownfields).

Assignment of Scale Levels

It is likely that projects that consist of large-scale infrastructure improvements may have much larger impacts than projects that make small-scale improvements. For this reason, I decided to sort the data set into groups of projects of a similar scale and then conduct comparisons of the projects within each scale cohort, in order to identify factors associated with successful projects. I took funding level as a proxy for the scale of the project, assuming that larger-scale projects used more funding than smaller-scale projects.

I then separated the projects into three groups based on total project funding. The 18 small projects received less than $400,000 in funding; the 15 medium-scale projects received from $400,000 to less than $1 million in funding; and the 19 large projects received from $1 million to less than $3.1 million in funding. I did not analyze four very large projects, which received more than $4 million in funding, because they would have been outliers to the large-project group, but they were not numerous enough to form their own group.

The 52 remaining projects involved a variety of infrastructure improvements in support of economic development. Project activities included the construction and renovation of access roads; water- and sewer system-extensions and expansions, including the construction of storage and treatment

tanks; and site development and building construction in industrial parks. The projects experienced varying degrees of success, which made the data set appropriate for the type of analysis I performed, which focused on identifying common characteristics among successful and less-successful projects.

Determination of Success Levels

In order to compare individual projects, I had to choose one measure by which to rank the projects' success levels. I decided to use the total number of jobs resulting from the project as this measure. Given that one of the main goals of local economic development is job creation, I determined that a measure of the employment retention and generation of each project would be a reasonable and informative way to rank the projects for the purpose of identifying and comparing projects with different levels of success.

Thus, in addition to sorting the projects into groups based on their level of funding, I further separated the projects within each group according to their employment impacts. Natural breaks in the data allowed me to separate each scale group into three segments, which I call high-success or high-ranking, medium-success or medium-ranking, and low-success or low-ranking projects (See Table 3.1). In the small-scale project group, natural breaks in the data separated four projects that resulted in 30 jobs or less, seven projects that ranged from 80 to 150 jobs, and seven projects that resulted in over 250 jobs. The breaks in the medium-scale projects separate four projects that created 65 or fewer jobs, a set of six middle-range projects that resulted in more than 100 jobs but fewer than the group mean of 532 jobs, and five projects that resulted in over 700 jobs. Natural breaks in the large-scale projects separate the data into

three groups: nine projects with fewer than 450 jobs, four projects with over 700 but fewer than 1000 jobs, and six projects with more than 1000 jobs.

Table 3.1 Frequency of Projects by Scale Group and Success Level

Scale Group	High Success		Medium Success		Low Success		Total
	Number of Projects	Number of Jobs	Number of Projects	Number of Jobs	Number of Projects	Number of Jobs	Number of Projects
Large	6	> 1,000	4	700 - 1,000	9	< 450	19
Medium	5	> 700	6	100 - 532	4	<= 65	15
Small	7	> 250	7	80 - 150	4	< 30	18
All Projects	18		17		17		52

Source: author's calculations based on EDRG information

Analysis

My analysis consists of three types of comparisons. I compare scale groups with one another; I compare projects of different success levels within each scale group; and I compare all projects of different success levels. The latter comparison requires a new grouping of projects: all high-success projects (small, medium-scale and large) are compared with all medium-success projects and all low-success projects.

Areas of Interest

I perform these comparisons for four main areas of interest: (1) economic impacts and efficiency of public funding, (2) project type , (3) selected characteristics associated with employment impacts, and (4) population and employment trends in project areas.

Project Types

My comparison of project types consists of an analysis of how the type of infrastructure involved in economic development projects is related to project scale and level of employment impacts. I classify each project under one of five main project types: exclusive water/sewer projects, exclusive access-road projects, combined water/sewer and access-road projects, industrial-park projects, and combined industrial- park and water/sewer projects. Exclusive water/sewer projects consist of projects in which water and/or sewer infrastructure was constructed, improved, or expanded. Examples of such projects include construction of water storage tanks, extension of water and sewer lines to a previously unserved site or area, or expansion of an existing water- or sewage-system's capacity. Exclusive access-road projects consist of projects in which access-roads were built or improved. Some projects involve access roads as well as water or sewer infrastructure, such as several projects serving industrial parks. I classify these as combined access-road and water/sewer projects. A few projects consist of site acquisition or facility improvements in industrial parks, and I classify these as industrial-park projects. Finally, a few projects involve industrial-park improvements, such as those described for industrial park projects, but also include water/sewer infrastructure. I classify these as combined industrial-park and water/sewer projects. My analysis of project types differs from the EDA and ARC evaluations in that I compare projects by their scale levels and not only by the type of infrastructure they involve.

Economic Impacts and Efficiency of Public Funding

I then compare the economic impacts and efficiency of public funding for projects of different scales and success levels. I consider economic impacts in terms of jobs, businesses served, and private investment. **Total jobs** refers to the sum of (1) jobs that were reported to have been retained by the project, (2) new jobs the creation of which was attributed to the project, and (3) new jobs the creation of which is indirectly tied to the project. **Private investment leveraged** by the project is a measure of business investments that were reported to have resulted from the project. For example, for a project in which a sewer line served a site in an industrial park at which a manufacturing firm located, the private investment leveraged would be the spending of the manufacturing firm associated with their new facility. **Business served** refers to the number of businesses that were served by the project. These numbers, in general, reflect the number of businesses that directly benefited from the project: thus I expect the number to be larger for large projects and smaller for small projects. However, some large projects serve one large company, and in such cases the number of businesses served would not correlate with the scale of the project. The number of businesses served by a project gives a slightly different measure of success than private investment or employment measures, since a project may succeed in serving a large number of small businesses while having smaller impacts in terms of jobs and private investment than a project that serves one large business. I present the data but, as mentioned above, I use employment impacts to rank the success of projects within each scale group throughout the analysis.

The two private consulting groups (mentioned earlier) that conducted the ARC Evaluation developed these data, and I did not alter the data for my analysis. The consulting firms obtained data on the number of businesses served, the number of jobs retained and created, and the private investment leveraged by each project during interviews with local officials in the county in which the project was implemented. These officials were often the recipients of the ARC grants for the projects in question, and they were generally elected officials and/or members of local economic development organizations.

The consultants at the EDRG calculated the number of direct and indirect jobs resulting from the project as follows. They obtained figures on the number of jobs retained by the project and the new jobs resulting directly from the project in the interviews. They used the Impact Planning (IMPLAN) model to calculate the indirect and induced jobs resulting from the project. A multiplier for each project was given by county-level IMPLAN data for the industrial sector or sectors most directly impacted by the project and multiplied by the number of new jobs resulting directly from the project.

I consider the efficiency of public funding in terms of the ratio of public dollars spent to jobs resulting from the projects and the ratio of private investment leveraged to public dollars spent. By comparing small, medium-scale, and large projects according to their economic impacts and the efficiency with which public funding is used, I obtain information about the relationship between the level of public funding a project receives and the level and efficiency of economic impacts that result from the project. I then compare the private investment and business service impacts of projects with different levels of employment impacts to obtain information about how different indicators of

success are related and about the quality of employment impacts as a measure of overall project success.

Selected Characteristics Associated with Project Success

I consider several characteristics of projects that I expect to be associated with project success (as measured by employment impacts). I compare the number of projects in the different scale groups and success levels that have the characteristics of targeting specific businesses, targeting areas with economic development potential, and/or removing bottlenecks to growth. This part of the analysis is one of the most important in terms of identifying characteristics associated with project success levels.

Population and Employment Trends in Project Areas

Finally, I compare the projects with respect to population and employment growth in project areas during the period surrounding project implementation. Using data from the Bureau of Labor Statistics on Mid-March employees and data from the U.S. Census Bureau on yearly population estimates, I calculate for each project area the change in population and employment from the year before the project began to two years after the project was completed. (Project starting and ending dates are included in the EDRG database from which I obtained much of the data that I use throughout this analysis.) In a few cases, projects were completed in 1996 or 1997, so that data are unavailable for the years after the project was completed. In these instances I calculate the change in population and employment up until the most recent year for which data are available. My comparison of projects of different scale and success levels with

respect to the population and employment growth that the project areas were experiencing is another important component of this analysis, as described in previous chapters.

Limitations of the Data

The data are limited in several respects. First, I am using interview data collected in preparation of the Evaluation of ARC's Infrastructure and Public Works Program Projects. The purpose of the data was primarily to assess the impacts of these projects and not to identify factors associated with project success. Second, the data on businesses served by the projects, private investment leveraged, businesses targeted, etc. were self-reported by interviewees, most of whom were involved in designing and/or implementing the project. The data therefore may overestimate the actual impacts of the projects. However, this may be true for all the projects and may not affect the overall results. Third, I am using employment data from the Bureau of Labor Statistics, which does not distinguish between full- and part-time jobs when reporting number of employees. Fourth, the data on the projects reflect the projects' short-term impacts. However, some impacts of infrastructure projects only become apparent in the long-term. This study will not capture these impacts.

Summary

I use data developed by the ARC and the EDRG to analyze 52 infrastructure projects in the Appalachian mountain region. I compare the projects in terms of their scale level, which is defined by the amount of funding they receive, and by

their success level, which is defined by the number of jobs resulting from the projects. I examine project performance in terms of jobs created and retained (including direct, indirect, and induced), businesses served, and private investment leveraged by the projects. I consider the distribution of the type of infrastructure improvement made by the projects with respect to their scale and their success level. I present data on the frequency of certain characteristics in projects of different scale and success levels, and, finally, I look at population and employment trends in project areas. The goal of the analysis is to identify factors that are associated with, and perhaps causally related to, project outcomes.

Chapter Four
Examining the Success and Failure of Local Economic Development Projects in Appalachia

In this chapter, I present the results of my analysis of 52 infrastructure projects in the Appalachian region implemented in the late 1980s to mid 1990s.

If factors associated with project success can be identified, funding agencies can use this information to make better decisions about how to allocate their funding resources in order to achieve certain types of economic impacts. Different types of outcomes may be associated with different causal factors: characteristics of projects that result in a lot of employment opportunities may differ from those associated with projects that serve a lot of businesses. In this chapter, I focus on economic impacts in terms of jobs. Employment opportunities are a primary emphasis of most economic development programs and projects, and an understanding of the characteristics of projects that result in high employment generation and retention would be valuable for many funding agencies, as well as for local economic development officials.

In the first part of the chapter, I discuss economic impacts of projects in different scale groups and success levels. I consider economic impacts in terms of jobs, private investment, and businesses served by the projects. I also discuss differences in the efficiency with which public funding was used to achieve project impacts. I then discuss variations in the efficiency of public funding in terms of jobs created and private investment. My expectation is that average impacts in terms of private investment will be larger for successful projects. Because I defined success in terms of jobs, job impacts will clearly be higher for high-success projects within each scale group, while average impacts

in terms of businesses served may or may not correlate with the project-success level I defined.

In the second part of the chapter, I discuss the frequency of different types of infrastructure projects in different scale groups and success levels of projects.

In the third part of the chapter, I discuss selected characteristics of the projects that I expect to be associated with successful projects. These include the characteristics of being targeted at specific businesses, being targeted at areas with high economic-development potential, and removing bottlenecks to growth. I expect successful projects to be tied to specific businesses and to have removed bottlenecks to growth and/or served areas with high economic development potential. I expect these characteristics to be less frequent among projects with low levels of success.

Finally, I compare population and employment growth in the project areas, by scale group and by success level. I expect that the scale of the project would correlate to some extent with the population growth rate and total employment growth rate, since growing areas might be more likely to be implementing large-scale projects. I also expected successful projects to have higher growth rates than less successful projects, since areas with growing populations and employment might be better able to take advantage of infrastructure improvements designed to forward economic development goals.

4.1 Project Performance Overview

I give an overview of project performance in terms of jobs, private investment leveraged, and businesses served. I try to answer two questions. First, did projects that received more funding result in more jobs than projects that received less funding? To determine this, I compare job outcomes of large, medium-scale, and small projects. Second, did projects with high employment impacts also have high impacts in terms of private investment leveraged and businesses served? To determine this, I compare success level with private investment and businesses served outcomes. Third, which projects were most efficient in their use of public funding? To determine this, I compare projects by scale group and by success level in terms of the public money they spent per job resulting from the project and the private investment leveraged by the project per public dollar spent.

The variation in public funds per job between high- and low-success projects was very large: depending on project scale, it varied from a factor of 7 to a factor of 75. This fact reinforces the value of investing in high-success projects and the potential importance of identifying good predictors of high-success projects.

Jobs, Private Investment, and Businesses Served

Although I define success in terms of job impacts for the purpose of this analysis, project success is multi-dimensional. Local officials and funding agencies do not just care about how many jobs are created or retained by a project, although this is often a primary concern. Other measures of project

success, such as the amount of private investment leveraged by a project and the number of businesses served by a project, are also important.

I present an overview of the relationship between project performance in terms of job impacts and these other measures of project performance, to give an idea of the applications of the results of the analysis. It may be that projects that created a lot of jobs did not perform well on these other indicators of project success. If so, this suggests that the results of this analysis hold only for project success in terms of jobs, and that other studies would be needed to identify factors associated with other types of project success.

Since data on the number of businesses served by projects and the amount of private investment leveraged by projects were obtained after the projects were implemented, they cannot be used to predict project success. These data represent the actual outcomes of the projects, which, in many cases, were not entirely anticipated in the planning stages.

Does more public funding translate into larger impacts for economic development projects involving infrastructure improvements? This is perhaps the most basic question I have asked in this analysis, but it is very important. Large projects have high visibility and may be more politically appealing than small projects. However, they also demand large amounts of public funding.

Table 4.1 Range and Average Funding Levels and Impacts of Small, Medium-Scale, and Large Projects

	Small	Medium-Scale	Large
Average Public Funding	$251,093	$586,585	$1,932,817
Average Job Impacts	277	657	663
Average Private Investment Leveraged	$9,377,778	$34,791,800	$26,910,526
Average number of businesses served	4	5	3

Source: EDRG and author's calculations based on data from EDRG

Table 4.1 shows that high funding levels do not necessarily mean large impacts. Average funding for large projects is about 3.3 times more than for

medium-scale projects. However, the average private investment leveraged by large projects is slightly less than that leveraged by medium-scale projects, and the average number of jobs resulting from large projects is only slightly higher than the number resulting from medium-scale projects. Large projects tend to serve fewer businesses than either medium-scale or small projects.

Small projects were most efficient in their use of public funding to create and retain jobs (Table 4.2). Small projects spent about three times less public money per job than medium-scale or large projects. This indicates that agencies with limited resources can create more jobs by investing in small projects, even though the larger projects tend to be more visible and perhaps more politically appealing. Large projects also leveraged the least private investment per dollar of public funding.

Table 4.2 Efficiency of Public Funding for Large, Medium-Scale, and Small Projects

	Large	Medium-Scale	Small
Public Dollars per Job	$7,154	$8,500	$2,449
Private Investment per Public Dollar	$14	$59	$37

Source: the author's calculations based on information from EDRG

Small Projects

The small projects range in funding from $85,300 to $380,000 (Table 4.3)

Table 4.3 Selected Project Impacts of Small Projects

Small Projects	Minimum	Maximum	Mean	Median
Total Public Funding	$85,300	$380,000	$251,093	$279,764
Total Jobs (New and Retained)	0	942	277	128
Businesses Served	0	26	4	1
Private Investment Leveraged	$0	$44,700,000	$9,377,778	$4,700,000

Source: EDRG and author's calculations based on data from EDRG.

Total jobs (retained, direct, indirect, and induced) resulting from the projects ranged from none to 942, while the number of businesses served by the

projects ranged from none to 26. Private investment leveraged by the projects ranged from none to $44,700,000.

Projects with high impacts in terms of job creation and retention tended, on average, to be more efficient in terms of public funding (Table 4.4). The ratio of public funding to jobs is 4.2 times higher for projects with medium success than for projects with high success, and 18 times higher for projects with low success than for projects with high success. This is reasonable, considering that the small projects all received a similar range of funding, so that projects that created more jobs would spend fewer public dollars per job created. However, the fact that successful projects are more efficient in their use of funding underlines the importance of trying to identify factors that can be used to predict project success.

Table 4.4 Average Project Impacts and Efficiency of Public Funding of Small Projects

Small Projects	High success	Medium Success	Low Success
Jobs	596	112	10
Public Dollars per Job	$541	$2,270	$9,750
Private Investment	$19,942,857	$3,400,000	$1,350,000
Private Investment per Public Dollar	$62	$16	$15
Businesses Served	7	2	0

Source: EDRG and author's calculations based on data from EDRG

The amount of private investment leveraged, as well as the ratio of private investment leveraged to public funding, was highest for high-success projects. The average number of businesses served by high-success projects was also higher than for medium- and low-success projects. This shows that the small projects that resulted in the most jobs and the most private investment also leveraged the most private investment and job creation/retention per public dollar, and served the largest number of businesses, on average.

These results indicate that, in the case of these small projects, the number of jobs resulting from projects seems to be a good measure of project success. Projects with high employment impacts also had high private-investment impacts, served more businesses than other projects, and generated the most employment and private investment per public dollar.

Medium-Scale Projects

The medium-scale projects range in funding from $407,300 to $973,000 (Table 4.5). Total jobs (retained, direct, indirect and induced) resulting from the projects ranges from none to 3,274, and the number of businesses served by the projects ranges from 0 to 36. Private investment leveraged by these projects ranges from none to $300,000,000.

Table 4.5 Selected Project Impacts of Medium-Scale Projects

Medium-Scale Projects	Minimum	Maximum	Mean	Median
Total Funding	$407,300	$973,000	$586,585	$524,200
Total Jobs (New and Retained)	0	3,274	657	396
Businesses Served	0	36	5	3
Private Investment Leveraged	$0	$300,000,000	$34,791,800	$10,000,000

Source: EDRG and author's calculations based on data from EDRG

Medium-scale projects display the same trends as small projects in terms of economic impacts and efficiency of public funding (Table 4.6). Projects with medium success levels spend 5 times more public money per job than projects with high success, and projects with low success spend 75 times more public money per job than projects with high success! The amount of private investment leveraged, the ratio of private investment leveraged to public funding, and the number of businesses served, were all highest for high-success projects.

These results corroborate the finding for small projects that the number of jobs resulting from projects seems to be a good measure of project success. Projects with high employment impacts had high private-investment impacts, served more businesses than other projects, and generated the most employment and private investment per public dollar.

Table 4.6 Average Project Impacts and Efficiency of Public Funding of Medium-Scale Projects

Medium-Scale Projects	High Success	Medium Success	Low Success
Jobs	1,582	304	29
Public Dollars per Job	$455	$2,289	$34,332
Private Investment	$80,290,000	$19,083,333	$1,481,750
Private Investment per Public Dollar	$106	$43	$2
Businesses Served	9	4	2

Source: EDRG and author's calculations based on data from EDRG

Large Projects

Large projects range in funding from $1 million to $3,081,000 (Table 4.7). Total jobs (retained, direct, indirect and induced) resulting from the projects ranges from 54 to 1,592, and the number of businesses served by these projects ranges from 0 to 15. Private investment leveraged by these projects ranges from none to $284 million.

Table 4.7 Selected Project Impacts of Large Projects

Large Projects	Minimum	Maximum	Mean	Median
Total Public Funding	$1,000,000	$3,081,200	$1,932,817	$1,700,000
Total Jobs (New and Retained)	54	1,592	663	715
Businesses Served	0	15	3	2
Private Investment Leveraged	$0	$ 284,000,000	$26,910,526	$11,300,000

Source: EDRG and author's calculations based on data from EDRG

The large projects show slightly different trends in terms of the efficiency of public funding for the projects (Table 4.8). Like small and medium-scale projects, high-success large projects use the least public funding per job created or retained. However, low-success projects generated more private investment,

both absolutely and per dollar of public funding, than medium- and high-success projects. This indicates that large projects may be more likely to serve large, capital-intensive businesses than medium-scale or small projects, and that private investment leveraged should not be thought of as correlated with employment impacts for large projects.

Table 4.8 Average Project Impacts and Efficiency of Public Funding of Large Projects

Large Projects	High Success	Medium Success	Low Success
Jobs	1,258	793	208
Public Dollars per Job	$1,830	$2,155	$12,925
Private Investment	$22,800,000	$9,250,000	$37,500,000
Private Investment per Public Dollar	$11	$6	$20
Businesses Served	4	2	4

Source: EDRG and author's calculations based on data from EDRG

4.2 Project Types

I present both aggregate and disaggregate data on the frequency of project types for small, medium-scale, and large projects, and for all projects. Most of the projects were water/sewer or access-road improvements. Overall, water/sewer projects were more frequently successful than access-road and other projects.

Small Projects

Among small projects, high-success projects included a higher percentage of exclusive water/sewer projects than of other types of infrastructure projects, while low-success projects did not include any exclusive or combined water/sewer projects (Table 4.9).

Table 4.9 Infrastructure Improvements of High-, Medium-, and Low-Success Small Projects

Small Projects	Water/ Sewer	Access-Road	Water/Sewer and Access-Road	Indus-trial Park	Industrial Park and Water or Sewer	Row Total
High Success	3 (43%)	2 (29%)	2 (29%)	0	0	7 (100%)
Medium Success	3 (43%)	3 (43%)	0	0	1 (14%)	7 (100%)
Low Success	0	3 (75%)	0	1 (25%)	0	4 (100%)
Total	6 (33%)	8 (44%)	2 (11%)	1 (6%)	1 (6%)	18 (100%)

Source: the author's calculations based on data from EDRG

The infrastructure involved in the seven high-success small projects included three exclusive water and sewer projects, two water/sewer and access-road projects, and two exclusive access-road projects. The water/sewer projects included water- and sewer-line extensions to commercial and industrial sites and the construction of a water- storage tank for an industrial park. Two projects involved water, sewer, and road infrastructure to serve industrial parks, and both exclusive access-road projects also served industrial parks.

Medium-success projects included an equal percent of water/sewer and access-road projects. The medium-success small projects included three exclusive water/sewer projects, three exclusive access-road projects, and a combined industrial park-water/sewer project. The exclusive water/sewer projects included the construction of a sewage treatment facility and collection system, sewer-system improvements and a sewage-system expansion. Three projects involved the construction of access roads, and one project involved development of an industrial site and a new sewer line to serve the site.

Low-success projects were mainly exclusive access-road projects. The low-success small projects included three access-road projects and an industrial-park project. Each of the access-road projects involved the construction of new

access roads, in one case to replace a deteriorated road. The industrial-park project involved the acquisition of a site for the expansion of an industrial park.

Medium-Scale Projects

Table 4.10 Infrastructure Improvements of High-, Medium-, and Low-Success Medium-Scale Projects

Medium-Scale projects	Water/ Sewer	Access-Road	Water/Sewer and Access-Road	Industrial Park	Industrial Park and Water or Sewer	Row Total
High Success	3 (60%)	2 (40%)	0	0	0	5 (100%)
Medium Success	5 (83%)	0	1 (17%)	0	0	6 (100%)
Low Success	2 (50%)	1 (25%)	1 (25%)	0	0	4 (100%)
Total	10 (67%)	3 (20%)	2 (13%)	0	0	15 (100%)

Source: the author's calculations based on data from EDRG

My comparison of success levels among the medium-scale projects does not yield any interesting observations. The high-success medium-scale projects included three exclusive water/sewer projects and two exclusive access-road projects (Table 4.10). The three water/sewer projects consisted of a water- and sewer-line extension, the expansion of a sewage treatment plant, and the extension of water service. The access-road projects included the construction of a road serving an industrial park and the widening of a road to alleviate traffic problems.

The medium-success, medium-scale projects included five exclusive water/sewer projects and one project that involved water/sewer and other infrastructure. The exclusive water/sewer projects included water-system improvements and extensions, sewer-line extensions, and the installation of water/sewer lines to industrial parks. The multiple infrastructure projects included the construction of a water tank and an access road in an industrial park.

The low-success, medium-scale projects included two exclusive water/sewer projects, one access-road and water/sewer project, and one access-

road project. The water/sewer projects included a water-line extension, the construction of a storage tank, and the extension of sewer lines and pump stations. Another project involved infrastructure and a roadway for an industrial park, and another project made improvements to an existing road.

Large Projects

Table 4.11 Infrastructure Improvements of High-, Medium-, and Low-Success Large Projects

Large Projects	Water/ Sewer	Access-Road	Water/Sewer and Access-Road	Industrial Park	Industrial Park and Water or Sewer	Row Total
High Success	4 (67%)	1 (17%)	0	1 (17%)	0	6 (100%)
Medium Success	4 (100%)	0	0	0	0	4 (100%)
Low Success	4 (44%)	2 (22%)	2 (22%)	0	1 (11%)	9 (100%)
Total	12 (63%)	3 (16%)	2 (11%)	1 (5%)	1 (5%)	19 (100%)

Source: the author's calculations based on data from EDRG

Among large projects, access-road projects made up a larger percentage of low-success projects than of medium- or high-success projects, while water/sewer projects made up a smaller percentage of low-success projects than medium- or high-success projects (Table 4.11).

The largest component of high-ranking large projects was exclusive water/sewer projects. The water/sewer projects included the provision of new water and sewer systems, the construction of a water-treatment plant, and water- and sewer- line extensions and improvements. Another high-ranking project involved the construction of an access road, and another made improvements to an air center at an airport (this was classified as an industrial-park project).

The medium-success large projects were all exclusive water/sewer projects, including water system expansions and improvements and extensions of water and sewer lines.

The low-success large projects included four water/sewer projects, two water/sewer and access-road projects, one water/sewer and industrial-park

project, and two access-road projects. The exclusive water/sewer projects included the provision of water and sewer service for an industrial site, an expansion of an existing sewage system, the construction of a storage tank and water-line extension for an industrial park, and the extension of an existing water system. The three water/sewer and access-road projects all served industrial parks with water/sewer and access infrastructure. The access projects included the construction of a stretch of highway between two towns and the improvement of access to port facilities next to an industrial park.

In conclusion, an analysis of success levels of different types of infrastructure projects within each scale group indicates that, regardless of scale group, projects that deal exclusively with water/sewer infrastructure may tend to be more successful than projects that deal exclusively with access-road infrastructure.

Comparing Scale Groups

Water/sewer and access road projects comprised 42 of the 52 projects (Table 4.12). A greater incidence of water and sewer projects is seen for large and medium-scale projects, while more access-road projects were implemented among the small projects. Among large projects, 58% were water/sewer infrastructure projects. Water/sewer projects comprised 73% of medium-scale projects. In contrast, only about 33% of small projects dealt primarily with water/sewer infrastructure. Access-road projects comprised only 16% of large projects and 20% of medium-scale projects, compared to 44% of small-scale projects. This indicates that access-road projects tend to require less public funding than water/sewer projects.

Table 4.12 Infrastructure Improvements of Large, Medium-Scale and Small Projects

	Water/-Sewer	Access-Road	Water/Sewer and Access-Road	Industrial Park	Industrial Park and Water or Sewer	Row Total
Large	11	3	3	1	1	19
Medium-Scale	11	3	1	0	0	15
Small	6	8	2	1	1	18
Column Total	28	14	6	2	2	**52**

Source: the author's calculations based on information from EDRG

Water/sewer projects also occur more frequently as high- and medium-success projects than as low-success projects (Table 4.14). Over half of all high-success projects were water/sewer projects, and over 75% of medium-success projects were water/sewer projects. Access-road projects, on the other hand, were most frequent among low-success projects.

Table 4.13 Infrastructure Improvements of High-, Medium-, and Low-Success Projects for All Projects

All Projects	Water/ Sewer	Access-Road	Water/Sewer and Access-Road	Industrial Park	Industrial Park and Water or Sewer	Row Total
High Success	10	5	2	1	0	18
Medium Success	13	3	0	0	1	17
Low Success	5	6	4	1	1	17
Total	28	14	6	2	2	52

Source: the author's calculations based on data from EDRG

Why do water/sewer projects seem, in general, to be more successful than access-road projects? A possible explanation is that access to an area will not by itself secure investment in that area, but it is nevertheless a necessary precondition to making an area suitable for private activity. Water/sewer projects may have been more successful because they serve areas that already have access roads and are providing the final link in what is needed to secure private investment. If so, less successful water/sewer projects might be those that make improvements to water/sewer infrastructure without precondition pieces being in place (e.g. access roads).

Consider a parcel of land that a public or private entity owns and wishes to develop. The first step is to clear the land so that a plant or building could be constructed on it. Even this first step is not possible if the site cannot be accessed. Building materials also have to be transported to and from the site. For the building and site to become operational, utilities will most likely be needed. Thus, water/sewer projects might follow access improvements in a natural order of preparing a site for a private company's operations.

I do not have sufficient data to test this hypothesis. In addition, several examples from the data suggest that additional factors must also be considered in seeking an explanation for why access-road projects tend to be less successful than water/sewer projects.

An example of a successful access-road project was the Fox-Shannon Industrial Park Improvements project in Belmont County, Ohio. This was a small project, but it resulted in 662 jobs. The project provided the initial access road into an industrial park. Belmont County lies along the Ohio River in eastern Ohio. The county's geography consists of steep hills and narrow valleys, with plentiful water supplies as well as coal, limestone, and clay deposits. The economic health of the county traditionally depended on basic industries of steel, coal, and glass-making; however, the output of these industries have had large declines in the last 20 years. Coal mining has suffered the greatest decline in the county – employment dropped 55.5 percent from 1981 to 1986. This trend continued through the 1980s, with manufacturing activity also decreasing.

The county believed that "large tracts of property, graded, sewered, planned and with access to a major highway " were needed for the area's

economic recovery. Most of the county's developed property was along the river and was scarce and expensive. The plan for an industrial park complex that this project helped to forward is part of Belmont County's long-range development proposal. There were no other similar facilities and/or services available in the area when the project application was submitted to the ARC.

The United Parcel Service (UPS) had already purchased acreage in the new industrial park when the project application was submitted. The access road to be build in this project would let them locate on the site. However, when the opportunity arose to recruit a new state prison to the site instead, the county bought out UPS's option on the land.

An example of a low-success, access-road project is the Northeast Mississippi Industrial Park Water Facility project in Tishomingo County, Mississippi. This project resulted in no jobs. It was a medium-scale project that installed water lines and a storage tank to an industrial park. The storage tank was intended to provide capacity for fire fighting so that industries in the park could install sprinkler systems to meet insurance requirements. The project was also intended to open up acreage for development.

This is a project that seems like it had a good prospect of succeeding, at first glance. At the time that the project application was submitted to the ARC, a NASA solid-rocket production facility was under construction 9 miles north of the project area, which was expected to stimulate the area economy. Local officials anticipated possible spin-off and support industries for the solid-rocket production plant as well as increases in basic manufacturing due to the area's improvements in transportation, utilities, public infrastructure, and, especially, education. Developed industrial land was seen as the limiting factor in the area's growth.

Local officials reported that there was no developed acreage left in the northern half of the county, at the center of the NASA impact area.

Land near a waterway had been acquired for use as an industrial park, but at the time of the project application only a small part had road access. One industry (which builds drums) had located in the one corner of the park that could be reached by an existing street. The project proposed installing a water line in the right-of-way of the proposed access road, which would connect the industrial park to a highway.

Two companies moved into the park – a manufacturer of mobile homes and a manufacturer of fiberglass tubs. However, one relocated and the other closed. Officials who were interviewed reported that they were marketing the buildings and interest had been expressed in them. Although the application to ARC requested funding for water lines through the industrial park, sewer lines and roads were also constructed and two speculative buildings were built. Unfortunately I do not have data on the timing of the infrastructure investments. It is possible that access roads were not available or were inadequate when the water lines were installed, and that this made the industrial park an unsuitable location for the manufacturers who initially moved into it.

It is not obvious why this project did not succeed. Local officials may have been incorrect in assuming that limited availability of developed industrial land was inhibiting economic activity in the area. It is also possible that local officials overestimated the economic impacts on their area of the new NASA facility.

Both of these projects contain elements of uncertainty: in Belmont, Ohio, the project succeeded partly because an unforeseen opportunity arose to recruit

a new state prison to the site being serviced by the project. The access road built in the project would have served UPS, but instead it served a much more labor-intensive prison operation. The scale of success of this project does not seem like it could have been predicted. The Tishomingo project failed (most directly) because, of the two companies that located in the industrial park, one moved out and the other closed its operation. Furthermore, I do not have information on the order in which infrastructure improvements were made in these two projects, so that it is not clear whether this had anything to do with their success or lack thereof.

Another low-success access-road project was the Road Marion Smith Industrial Access-Road project in Choctaw County, Mississippi. This small project, which created only 10 jobs, seems to have been unsuccessful because it targeted a company with very few employees. The project constructed an access road from a highway to the future site of a wood chip mill. Local, regional, and state plans and needs assessments for the area had all pointed out the need for industrial access roads, as reported in the project application to the ARC. The Alabama River Chip Mills, Inc., which processes timber resources, was the primary beneficiary of the project. This company was expected to employ 6 persons initially and eventually to expand to 12 persons. The project application stated that the access road connecting the chip mill with Mississippi State Highway 12 "will enhance the possibility of acquisition of this industry."

Incidentally, another very similar low-success small project was also implemented in Choctaw County, Mississippi. This was the Package Corporation of America's Utility Pole Mill Access project, which involved the construction of an access road to connect Mississippi Highway 15 to the Package Corporation of

America's Utility Pole Mill. The project was intended to enable the expansion of employment at the mill from 7 to 14. The pole mill expanded on the other side of the new road. Scales were added and employment was doubled, as projected. However, the facility went out of business. Local officials believe that the project still was beneficial in the longer term, because the site has been improved and has the potential to attract another user. Even if the mill had not closed, the project still would directly only have resulted in 7 jobs, and thus would probably still have been ranked low success. Local officials say that the timber industry is Choctaw County's principal economic base, and the purpose of this project was to expand the industry. The purpose of the previous project was to fulfill the need for jobs and for supplies for the wood industry. In the case of Choctaw County, focusing on projects that target the economic base does not seem to have been successful. Without knowing more about the local context of the projects, however, it is not possible to determine whether a more successful project could have been implemented in the area.

These examples suggest that there may be several reasons why access-road projects were less successful than water/sewer projects. In the three examples of unsuccessful access-road projects; one attracted companies, but they were not retained; one allowed an existing company to expand, but it then closed down; and the third fostered a private investment that employed very few. The successful access-road project discussed above served a new industrial park in which UPS had purchased some acreage; however, while the project was being implemented, the county recruited a new state prison which used the UPS site and employed a great deal more persons than UPS would have. The unsuccessful projects that failed to retain the businesses they originally served

and the successful project that bought out UPS's option on an industrial park site to use it instead for a prison both contain elements of randomness that are not predictable.

The hypothesis that there is a certain organic order followed by physical infrastructure improvements to make a site useable by private businesses did not receive support from these examples. However, I did not have appropriate or sufficient data to test this hypothesis, and it deserves more careful consideration in the future. It is possible that it explains, at least in part, why many water/sewer projects were successful and many access-road projects were not. The necessary infrastructure to serve a site that is to be used by a private business or businesses can often not all be funded under one project. A study of several sites, the evolution of the physical infrastructure serving those sites, and overall success of the sites would be needed to test whether the order in which infrastructure is installed in an area affects how successful a single infrastructure improvement is in terms of its economic impacts.

4.3 Characteristics of Successful Projects

My goal in this analysis was to identify characteristics that are associated with successful projects and that may be used to predict the success of economic development projects. I emphasize again that this analysis considers project success in terms of the *employment impacts* of projects. Within each scale group, I ranked projects according to the number of existing jobs that were retained by the project and new jobs that were directly or indirectly caused by the project, according to interviewees. High-success projects in each scale group

were those that resulted in the most jobs, while low-success projects were those that resulted in the fewest jobs.

There were a few characteristics that I expected to be associated with high employment impacts. I expected projects with high employment impacts to be targeted at a particular business or businesses (and/or a particular industry), to be targeted at an area that was considered to have a lot of economic development potential, and/or to focus on removing a bottleneck that was constraining growth in the area.

Targeting Specific Firms

I present data on the frequency of projects that targeted specific firms. I answer two questions. First, are projects that target specific firms correlated with success in job impacts? Second, does the scale of the project have any relationship to whether or not specific firms are targeted? Table 4.14 presents the frequency of selected characteristics for large- and medium-success projects and for low-success projects in each scale group.

I constructed a Chi-square test of the relationship between a project's success level and whether it targeted a specific firm. The results showed that there is not strong enough evidence from these data to conclude that there is a relationship between these two factors. The importance of the results is limited by the small size of the data set.

Among the large projects, two of the six projects that ranked at high-success levels targeted specific firms that intended to locate in the site served by the project, and one targeted an existing firm with plans to expand. One of the four large projects that ranked in the medium-success level targeted a new firm,

Table 4.14 Percent of Projects with Selected Characteristics – by Scale Group and Success Level

Scale Group	Success Level	Total Number of Projects	Number (and Percent) with indicated characteristic				
			target specific new firms or existing firms intending to expand	target area with high economic development potential	remove bottlenecks to growth	positive population growth	positive total employment growth
Small	Medium and High	14	13 (92.9%)	1 (7.1%)	0	11 (78.6%)	11(78.6%)
	Low	4	3 (75%)	0	0	3 (75%)	3 (75%)
Medium	Medium and High	11	7 (63.6%)	1 (9.1%)	4 (36.4%)	11	11
	Low	4	0	0	0	4	3 (75%)
Large	Medium and High	10	6 (60%)	3 (30%)	1 (10%)	8 (80%)	9 (90%)
	Low	9	4 (44.4%)	0	0	3 (33.3%)	2 (22.2%)
TOTAL		52	33 (63.5%)	5(9.6%)	5 (9.6%)	40 (76.9%)	39 (75.0%)

Source: EDRG

while three targeted existing firms with plans to expand. Four of the nine large projects with low-success levels targeted new firms, and none specifically targeted existing firms.

Two of the large projects with high-success levels specifically targeted high-tech industries. The Benendum Air Center Project in Harrison, West Virginia, facilitated the construction of private-sector manufacturing facilities related to the aerospace industry. The Clermont County Industrial Access-Road project in Clermont County, Ohio, primarily benefited a software engineering firm in a high-tech office/industrial park.

Two other high-success projects served large new businesses. The McDowell County Water and Sewer Extension project in McDowell County, North Carolina, served a large new prison (with over 400 jobs) and a new auto-parts manufacturing firm (with 200 jobs). The Union County/New Albany Water-Sewer

project in Union County, Mississippi, served the site of a new Wal-Mart Distribution Center, the location of which was contingent on the infrastructure improvements being made.

Among the medium-scale projects, three of the five projects with high-success levels targeted specific new firms and one targeted an existing firm with plans to expand. Three of the six projects with medium-success levels targeted specific new firms, while two targeted existing firms. None of the four projects with low-success levels targeted either specific new or existing firms.

The medium-scale project that resulted in the most jobs was the Cullman County Infrastructure Improvement project in Cullman County, Alabama. This project enabled the development of three industrial parks and a retail shopping plaza. It involved an extension of water and sewer lines in connection with access improvements to enable the expansion of businesses and the development of new sites in and outside of an industrial park in a developing commercial area. The project was intended to facilitate the development of a large retail development with a Wal-Mart and a grocery store, and the expansion of eight existing companies, the largest of which would generate 150 new jobs.

The Kings Point Water Line Extension in Jefferson County, Alabama, resulted in the second highest job impacts. This project enabled a $300 million investment in a new underground mine employing over 800 workers. The project also extended water service to 200 households, many of which had relied on private wells for water that was often contaminated with mud and iron.

Two of the four medium-scale projects with low-success levels served industrial parks that were being developed by the areas with the intention of making the areas more attractive to industry in general. Such broad goals, not

tied to a specific prospective investment, resulted in among the smallest job impacts in the group.

Among the small projects, five of the seven projects with high-success levels targeted specific new firms, while three targeted existing firms. Four of the seven projects with medium-success levels targeted specific new firms, while the other three targeted existing firms. One of the four projects with low-success levels targeted a specific new firm, and two targeted existing firms.

All of the small projects with high-success levels served one or more new businesses, though this was an explicit aim of only five of them. The small project that resulted in the most jobs was the Vista Industrial Center Water and Sewer project in Buncombe County, North Carolina. A plastics manufacturer had purchased acreage in the park and announced plans to build a 100,000 square foot facility. The project resulted in the attraction of eight firms to the Vista Industrial Center and contributed to the development of the surrounding area.

Two of the high-success projects served large new facilities, including Wal-Mart, Wegmans (a grocery store), an automotive plant, and a new state prison. The project that served a new state prison was (as discussed in the previous section) originally intended to serve a UPS facility in a new industrial park. However, the county bought out UPS's option on the site in order to use it instead for a state prison, which was a much more labor-intensive operation than UPS would have been, and helped to fulfill the area's stated need for quality jobs. The project that served Wal-Mart and Wegmans facilitated the development of a regional shopping center anchored by these two large firms. Local officials believe that the shopping center helped to attract a large manufacturing firm from France, which established its U.S. headquarters in the area.

These examples show cases in which targeting a specific firm or firms seems to have had a positive influence on the number of jobs resulting from the projects. However, a lot of projects, both successful and not successful, target specific firms. Merely being targeted to a specific business is no guarantee that a project will be successful. The projects described above served fairly large and/or labor-intensive firms.

Successful projects also tended to have commitment from the private firms that they were targeting with the infrastructure improvements and relatively clear strategies for how the project would fulfill the area's economic development needs.

Perhaps the best example of a well-laid out plan is the Vista Industrial Center Project in Buncombe County, North Carolina. This was the most successful small project, resulting in 942 jobs. This project extended water and sewer lines to an industrial park. The lines were extended along an existing highway to the industrial park, which is located at the intersection of existing roads (State highways 191 and 146), and along an existing access road within the industrial park. The site has access to I-26 and the nearby Asheville Regional Airport.

Two firms - a plastics manufacturing firm and a convenience store - had already purchased acreage in the park at the time that the project application was filed. However, local officials said that the development of the industrial center hinged on the availability of water and sewer service, which then stopped on State highway 191 just north of the project site. Nypro Asheville, Inc., a plastics manufacturing firm which has another plant in Buncombe County and 13

other facilities around the world – had announced plans to build a facility in the industrial park but needed utilities and road access to occupy the facility. An access road was in construction as a state-maintained roadway at the time the project application was filed, and was presumably complete by the time this water/sewer project was implemented.

The motivation for the project was the belief on the part of local officials that "part of the difficulty in attracting industry to Buncombe County has been a lack of quality industrial sites with adequate infrastructure." The Vista project was designed to overcome this weakness. Site Selection magazine in 1991 and 1992 called North Carolina the number one state in recruiting new industry. However, only two new industries were recruited to the Asheville area in that time period, and Western North Carolina overall received fewer than 4% of all new industrial jobs created in the state. Local officials said in the project application, "the major goal of the county's economic development effort is to create more jobs in a diversified economy that require higher skills and offer higher wages. The expansion and diversification of the county's manufacturing base is the means to achieve this goal."

The project also had three more specific goals that this project was intended to accomplish. First, to create 35 new manufacturing jobs in Buncombe County by January of 1994 (the Nypro facility was expected to fulfill this goal). Second, to provide infrastructure critical to attracting additional private investment and creating more new manufacturing and commercial jobs in the county. Extensive marketing plans had been laid out and included assistance from the Asheville area Chamber of Commerce, which was said to respond to

over 250 requests for site information from warehousing and distribution firms each year. Local officials also announced their intention to market the site to Los Angeles and Detroit area industries, and to display the industrial park at three national trade shows in Los Angeles, Detroit, and Atlanta. In addition, local officials intended to run advertisements in site magazines and trade journals, and to make corporate calls on 15 national site selection consulting firms. The third specific goal that this project was intended to fulfill was to complement ARC's investment in CarolinaWest, a seven-county regional industrial recruiting organization formed by economic developers in seven North Carolina counties to market the assets of the entire region to industrial prospects.

Removing Constraints to Growth and Servicing High-Potential Areas

Although relatively few projects targeted areas with high economic development potential and/or removed bottlenecks that were constraining growth in the area, all of the projects that did had either high- or medium-success levels.

The Boyd Rural Sanitary Sewer System Project in Boyd County, Kentucky, was the second-highest ranking large project. It resulted in 1,300 jobs. This project targeted an area with high economic development potential and removed a bottleneck to growth in the area. The project provided sewer service along an existing road (US60), replacing existing package sewer plants (which are analagous to pre-fabricated homes). The growth of the surrounding commercial/industrial/residential area was constrained by a ban on new package sewer treatment plants and the low performance of existing ones. As stated by local officials in their application to the ARC,

> Economic development in this area has been severely hampered due to Kentucky Division of Water bans on new packaged sewage treatment plants . . . The need for sewers is evident every day to commercial, industrial and real estate developers, realtors and private enterprise as they get turned down by the Health Authorities for subsurface sewage systems or package sewage treatment plants for businesses and houses.

The project was part of a plan for the future orderly growth of the area, which was seen as "the economic backbone for the future development of Boyd County and Eastern Kentucky. Ashland and this project area of Boyd County is the acknowledged trading center of Eastern Kentucky." The application included commitments from a number of companies to expand and hire a combined total of 502 additional staff in the two-year period following project completion. In addition to its economic objectives, the project was intended to abate problems of ground and surface water contamination in the area, due to non-functioning septic tanks and sewer plants. According to local officials, the project has enabled over $35 million in investment that would not have otherwise occurred. New businesses include two hospital outreach centers, a nursing home, 3 hotels, 3 banks, 5 restaurants, two convenience stores, and several office buildings

The large project with the lowest level of success was the Blount Mountain Water Extension project in Blount County, Alabama, which resulted in 54 jobs. This project extended water service along an existing highway to some small commercial/industrial establishments, some farming/poultry establishments, and a number of scattered rural residences. The purpose of the project, as stated in the project application, was to relieve limitations on agricultural growth. An unspecified company was said to have expressed a desire to expand the number of growers in the project area. According to local officials who prepared the

project application, "the lack of dependable and ample water sources in the area has severely limited the agricultural growth of the area. Row crop farmers desperately need a dependable irrigation source. With a dependable source of potable water, the potential of developing a washing and packing plant for certain crops in the area exists." The rationale for the project was expressed as follows: "With the number of farmers decreasing in the U.S., it is essential to provide this area, which has a great potential and interest for expanding agricultural operations, with its only limiting resource, a public water system." Local officials believed that the project would help with the area's underemployment problem, which they attributed to the inability of the area's small farms to provide families with an adequate income. The project application asserted that public water service would enable approximately 20 farm families to install drip irrigation system or additional poultry houses. However the outcome of the project was much less positive than anticipated.

Among the medium-scale projects, the highest-ranking project targeted an area with high economic development potential, and four projects (two with high-success levels and two with medium-success levels) removed bottlenecks to growth. The highest-ranking project, the Cullman Infrastructure Improvements project, was mentioned in the previous section but is worth looking at in more detail since it also provides another example of a successful project that had a relatively clear strategy for fulfilling the area's economic development needs.

This project resulted in 3,274 jobs in Cullman County, Alabama. The project extended water, sewer, and an access road in an area the development of which was constrained by a lack of utilities. The project area was said to be located "in the midst of a rapidly growing area" south of the city of Cullman's

central business district and along one of the main entrances to the city. "Despite growth and improvement in surrounding areas, the project area, as well as areas to the north and south of it, has not fully developed because of lack of utilities, lack of street access, difficult terrain, and inadequate storm drainage. The area's terrain had been smoothed and storm drainage had been installed in previous projects.[1]

The project application outlined the two main problems in the project area. First, the area suffered from utility lines that were inadequate in terms of both number and capacity and were hindering commercial and industrial development and expansion in the immediate project area and also in the Industrial park south of the project area. The second problem outlined in the application was a lack of street access in the area that was hindering further commercial development and industrial expansion. "In addition to the problems noted above, industries located south of the . . . area (in the Nix Industrial Park on the Old Hanceville Highway), have experienced production slowdowns and stoppages because of breaks in the existing water line and an inadequate backup system. These same industries have great difficulties expanding their facilities because of the poor street access to the area around the Nix Industrial Park and the resulting dangerous, congested traffic along the Old Hanceville Highway." The lack of adequate street access was said also to have been hindering the expansion of ten additional industries located along the Highway.

At the time the project application was filed, the owners of a building abandoned in 1982 and damaged by a tornado in 1988 had commitments from

---

[1] This may lend some support to the hypothesis that infrastruture improvements have a natural order of implementation (as discussed in the previous section).

WalMart, Inc to build a new store and from Del-Champs, Inc. to build a grocery store. The project application contained an assertion that "these commitments depend on the construction of First Avenue SW from Birmingham Street southward to King Edward Street to provide direct street access to the property." Commitment from WalMart and a grocery store were said in the project application to depend upon the access improvements.

Onieta Mills, which manufactures children's clothing and had been in business in the Nix Industrial Park since 1947, had plans to expand that were also contingent on the improvements made in this project. The company had purchased additional land across the street to construct a separate building for its warehouse shipping operation, but it was unwilling to proceed with the expansion until access improvements were made because it could not accommodate additional employees getting in and out of the parking lot.

The project application also included information about a recent survey showing that in the next year to year and a half, seven of ten companies along the Old Hanceville Highway planned to expand and hire additional employees. However, these companies were said to have been proceeding slowly with their expansion plans until efforts had been made to ease traffic congestion in the area. The project allowed existing businesses to proceed with expansion plans and enabled the development of several new commercial and retail and services businesses.

In sum it seems that a lot of planning went into assessing the existing problems in the area and designing a project that would fulfill the area's needs. The area was seen as having a great deal of growth potential, as expressed by

expansion plans of existing firms and commitments from new firms. The project focused on removing barriers to that growth.

Two of the projects that removed bottlenecks to growth upgraded utilities (a water system in one case, a wastewater system in the other) the condition of which were constraining growth. The Rutledge Wastewater Treatment project in Grainger County, Tennessee, corrected problems in the existing sewage system and expanded it to include more customers. The new system enabled the location of three new businesses and two new residential developments in the community.

The Benton Water System project in Polk, Tennessee, enabled five new businesses to locate in the community, including a French water-bottling factory that markets local water to upscale markets throughout the country under the "Crystal Geyser" label. None of the medium-scale projects with low-success levels either targeted an area with high economic development potential or removed bottlenecks to growth.

Among the small projects, only one targeted an area with high economic development potential. This was the Lumpkin County Industrial Park Water and Sewer Improvement project in Mississippi, which resulted in the second highest job impacts of the small projects. The infrastructure improvements supported development in the Georgia 400 corridor, claimed by local officials to be one of the hottest growth areas in the country. The services and the healthcare industry are said to be among the fastest growing. The project enabled the attraction of 26 new companies to the industrial park, helping to fulfill the county's stated need for quality jobs in industry.

4.4 Project Area Characteristics: Population and Employment Trends

I looked at the population growth and employment growth trends for each project from the year before the project began until two years after the project was completed. I expected that successful projects would tend to be in counties that were experiencing population and employment growth around the time that the project was being implemented. This would indicate that the area was in a period of growth, which might make it more attractive for private investment in general.

Small-Project Areas

The counties in which small projects were implemented experienced an average increase in population of 3.7% in the years surrounding project implementation (Table 4.15). Total employment grew by an average of 11.2% in these 17 counties. Manufacturing employment grew by an average of –0.1%. Total employment, as well as population, grew the most in medium-ranking project areas, on average, and grew least in low-success project areas. The low-ranking project areas experienced higher average employment growth in the agriculture, construction, transportation and utilities, and wholesale sectors than medium ranking projects, which in turn experienced higher average growth than high-ranking project areas in these same sectors. Medium-ranking projects experienced the highest growth in the services, retail, wholesale, and construction sectors, in that order. High-success project areas grew most in

employment in the services, wholesale, and construction sectors. Manufacturing employment grew by more in the high-success project areas than in the other project areas.

Table 4.15 Percent Growth of Population and Employment in Small-scale Project Areas – by Success Level

		Employment Growth (%)									
Success Level	Population Growth (%)	Total	Agriculture	Mining	Construction	Manufacturing	Transport /Utilities	Wholesale	Retail	F.I.R.E.	Services
High	3.0	9.4	-4.6	-30.7	19.2	6.8	9.2	21.4	16.1	9.9	22.8
Medium	5.5	14.5	6.0	3.1	20.3	-9.4	16.6	20.2	28.8	8.4	52.0
Low	1.7	8.4	50.0	-48.7	23.7	4.4	42.1	108.7	7.6	12.8	29.2
Total	3.7	11.2	6.9	-24.7	20.6	-0.1	19.4	40.3	19.1	10.0	35.5

Source: BLS and U.S. Census, 1985-1997

Medium-Scale-Project Areas

Medium-scale project areas experienced an average increase in population of 6.2% in the years surrounding project implementation (Table 4.16). Total employment grew by an average of 15.4% in these 15 counties. Average total employment as well as average total population growth was highest in the high-ranking project areas, followed by the median-ranking project areas and then the low-success project areas. This is in accord with the expectation that successful projects tend to take place in areas that are experiencing growth at the time of project implementation. The project then helps to support this growth. However when employment growth is looked at by sector, the results are not consistent. Employment in the agricultural and services sector also followed this trend, with growth highest in high-success areas and lowest in low-success areas. The high-success project areas experienced higher employment growth than the median- and low-success areas in agriculture, transportation/utilities, retail, and services.

Manufacturing employment grew most on average in medium-scale project areas, while it declined on average in low-success project areas. Employment growth in the wholesale sector was much higher in low-ranking project areas than in medium- or high-success areas. Low-success project areas experienced higher employment growth than medium-success areas in the transportation/utilities, services, retail, and construction sectors as well. Employment growth in F.I.R.E. was highest in the medium-success project areas, followed by the low-success areas.

Table 4.16 Percent Growth of Population and Employment in Medium-Scale Project Areas – by Success Level

		Employment Growth (%)									
Success Level	Population Growth	Total Employment	Agriculture	Mining	Construction	Manufacturing	Transport /Utilities	Wholesale	Retail	F.I.R.E.	Services
High	7.4	16.9	79.8	90.1	22.3	7.1	65.3	-6.5	29.9	8.0	32.9
Medium	5.6	15.2	76.8	-30.6	6.1	23.2	5.8	-1.7	21.1	47.7	32.2
Low	5.6	13.8	17.9	0.0	46.4	-2.6	37.5	98.4	25.3	21.1	55.0
Total	6.2	15.4	64.6	7.2	22.3	10.9	34.0	23.4	25.1	27.4	38.5

Source: BLS and U.S. Census, 1985-1997

Large-Project Areas

The results for large-scale projects are shown in Table 4.17. Large-scale project areas experienced an average increase in population of 4.7% in the years surrounding project implementation. Total employment grew by an average of 21% in these 19 counties. Manufacturing employment grew by an average of 21.2%. Total employment and population growth was greater, on average, in high-success counties than in medium-success counties, and higher in medium-success counties than in low-success counties. This is again consistent with expectations. Employment in the agriculture, construction, transportation/utilities, wholesale, retail, and F.I.R.E. sectors was highest in the high-success project

areas, followed by the medium and then the low-success areas (except in the transportation/utilities sector, in which the low-success project areas experienced more employment growth than the medium-success project areas).

Table 4.17 Percent Growth of Population and Employment in Large-scale Project Areas – by Success Level

Success Level	Population (%)	Employment (%)									
		Total Employ-ment	Agric ulture	Mining	Const ruction	Manu fact uring	Transport /Utilities	Whole-sale	Retail	FIRE	Serv ices
High	7.7	38.2	184.5	-13.4	86.3	19.6	39.1	164.2	37.0	31.7	59.6
Medium	5.8	20.3	56.4	-15.5	25.5	15.6	10.7	16.9	15.4	21.2	80.6
Low	2.1	9.9	31.7	36.5	25.2	24.8	20.5	10.4	12.4	6.9	28.9
Total	4.7	21.0	84.4	9.5	44.6	21.2	24.3	60.4	20.8	17.8	49.4

Source: BLS and U.S. Census, 1985-1997

Comparison of Population and Employment Trends in Scale Groups

Total employment grew most on average in large-scale project areas, as did employment in services, manufacturing, construction, wholesale and agriculture (Table 4.18). Manufacturing employment grew least in small-scale project areas. Population grew most in medium-scale project areas, followed by large-scale project areas.

Table 4.18 Average Percent Change in Population and Employment by Scale Group

	Population (%)	Employment (%)									
		Total Employ-ment	Agric ulture	Mining	Con-struc-tion	Manu fact uring	Transpo-rt/Utilities	Whole-sale	Retail	FIRE	Serv ices
Small-Scale	3.7	11.2	6.9	-24.7	20.6	-0.1	19.4	40.3	19.1	10.0	35.5
Medium-Scale	6.2	15.4	64.4	7.2	22.3	10.9	34.0	23.4	25.1	27.4	38.5
Large-Scale	4.7	21.0	84.4	9.5	44.6	21.2	24.3	60.4	20.8	17.8	49.4
Total	4.8	16.0	48.7	-1.1	29.9	10.9	25.4	42.7	21.5	17.8	41.5

Source: BLS and U.S. Census, 1985-1997

Comparison of Population and Employment Trends by Success Level

On average, high-success project areas experienced higher population growth and higher total employment growth than median-success project areas, which, in turn, experienced higher percent growth than low-success project areas, during the time in which the projects were being implemented (Table 4.19). This indicates that projects may have a better chance of succeeding in areas with high overall employment and population growth during the years of project implementation.

The results of the analysis were somewhat confusing when examined on a sectoral level. Low-success project areas actually experienced the highest percent growth, on average, of all success levels. The low-success project areas also experienced higher employment growth than the medium-success project areas in transportation/utilities and wholesale. Median-success project areas experienced more growth than high-success project areas in F.I.R.E. and services.

Table 4.19 Average Percent Growth in Population and Employment

		All High-Success Projects	All Medium-Success Projects	All Low-Success Projects
	Population	5.8	5.6	2.8
Emp	Agriculture	69.0	39.7	31.2
loy	Mining	1.4	-18.4	13.2
ment	Construction	42.4	16.5	29.9
...	Manufacturing	11.2	8.0	13.5
...	Transport/Utilities	34.7	11.4	29.6
...	Wholesale	61.2	11.7	54.2
...	Retail	26.9	22.9	14.3
...	FIRE*	16.7	25.3	11.6
...	Services	37.8	51.7	35.1
...	Total	21.1	16.1	10.4

* Finance, Insurance, and Real Estate
Source: Author's calculations based on data from EDRG

More detailed analysis is necessary to see what is behind these aggregate indicators. Looking at average employment by sector does not seem to yield any consistent results.

Summary

The purpose of this analysis was to identify characteristics that successful projects have in common. If such characteristics can be identified, they can assist funding agencies in making decisions about which projects to fund in order to achieve certain types of economic impacts. Throughout this analysis, I have focused on economic impacts in terms of employment. A separate analysis would be needed to identify factors associated with other types of project success. (See Further Research section in Conclusion.)

A few main points are evident from the above analysis. First, for small and medium-scale projects, job impacts are correlated with private investment impacts and number of businesses served by the projects examined. The correlation was weaker for large-scale projects, possibly because they tend to attract larger, but more capital-intensive, firms. Second, small projects are in general most efficient in terms of public dollars spent per job in the projects examined. Third, water/sewer projects tend to be more successful than access-road projects. Fourth, most projects are targeted at specific businesses, but successful projects tended to have clear strategies for how the project would fulfill the area's economic development needs. Fifth, only a few projects were targeted at high economic development potential areas or focused on removing bottlenecks to growth; however, all of these projects were successful. Finally,

successful projects tend to be in areas with growing populations and employment.

Chapter Five
Conclusions and Implications

The main purpose of this paper was to try to identify factors that influence the outcomes of economic development projects; however, the paper also tested the practice of analyzing projects based on their scale group. My rationale for analyzing projects of different scales separately was that different factors might influence the success of projects of different scales.

The analysis yielded some interesting results about where public funding for infrastructure economic development projects of different scales originates. I compared large, medium-scale, and small projects in terms of the average funding they received from local, state, federal, and ARC funding sources. The results indicate that projects of different scales rely more heavily on different sources of public funding. In particular, medium-scale projects receive a very small portion of their funding from the state level, both medium-scale and small projects rely more heavily on local funding than on any other source of funding, and the largest component of public funding for large-scale projects comes from the federal government.

Table 5.1 shows the amount of public funding that large, medium-scale, and small projects received from federal, state, local, and ARC sources. Medium-scale projects received about 2.3 times the total public funding as small projects and large projects received about 3.3 times the public funding as medium-scale projects. Medium-scale projects received over 5 times the federal funding and about 3 times the local funding as small projects. However, small projects received about 3 times the level of state funding as median projects.

Table 5.1 Average Public Funding by Source - Small, Medium-Scale, and Large projects

	Small	Medium-Scale	Large	Total
Federal Funding	11,510(4.6%)	67,126 (11.4%)	702,114 (36.3%)	324,522 (27.9%)
State Funding	12,161 (4.8%)	4,000 (0.7%)	330,046 (17.1%)	209,749 (18.0%)
Local Funding	78,560 (31.3%)	253,103 (43.1%)	487,472 (25.2%)	353,663 (30.4%)
ARC Funding	148,863 (59.3%)	262,356 (44.7%)	413,185 (21.4%)	274,512 (23.6%)
Total Public Funding	251,093 (100%)	586,585 (99.9%)	1,932,817 (100%)	1,162,445 (99.9%)

Source: author's calculations based on data from EDRG

It makes sense that large projects receive more local funding than medium-scale and small projects, on average, since I expect that larger projects would be more frequent in areas with larger tax bases. A larger local tax base means a bigger market, which makes the area more attractive for businesses and might make a project involving a large business or a large expansion of an existing business more likely in these areas than in areas with smaller tax bases. However it is interesting that local funding contributes less to overall project funding for large projects than for medium-scale and small projects.

It also makes some sense that large projects received more funding than medium-scale and small projects from the state level, since large projects are probably more likely than medium-scale or small projects to be seen by states as having regional significance. However, this probably does not completely explain why large projects received over 10 times the federal funding as medium-scale projects, about 2.5 times the local funding, but almost 75 times the state funding as medium-scale projects.

It is interesting that the large projects received so much of their funding from federal sources, while the small and medium-scale projects relied more heavily on local and ARC funding. These trends raise a question of whether federal and state funding favor large-scale projects. If this is so, it is possible that ARC funding is most important for small and medium-scale projects.

In this paper, I have tried to identify common characteristics among successful infrastructure economic development projects in the Appalachian Mountain region. This information would help funding agencies to predict which projects are more likely to succeed based on their characteristics. Agencies could then allocate their funding more effectively, resulting in potentially large gains in the efficiency of public spending to achieve economic impacts. I considered successful projects within each scale group to be those that created and retained the most jobs, and I looked for characteristics shared by these projects. I also compared the outcomes and characteristics of projects in different scale groups.

In my comparison of the outcomes of projects with different success levels, I showed that the difference in efficiency of public spending between high- and low-success projects can, depending upon the scale of the projects, be very large. This fact demonstrates the need for more studies and evaluations that focus on identifying factors that can be used to predict the outcomes of economic development infrastructure projects. If funding agencies could predict successful projects and use this information to allocate their funding, they could greatly increase the economic impacts generated per dollar of public funding.

Small projects seem to generate more employment impacts per dollar of public funding than medium-scale or large projects. In my comparison of the efficiency of public funding for projects of different scales, I showed that small projects use the least public funding per job created or retained. Funding agencies might be able to generate three times as many jobs by focusing on small projects.

I also showed that using the number of jobs resulting from projects as a measure of project success was not as uni-dimensional a measure of success as it may at first seem to be. The magnitude of job impacts seems to be correlated with the amount of private investment leveraged by projects and the number of businesses the projects served. However, the results of the analysis primarily describe factors associated with project performance in terms of employment impacts.

I had several expectations about the characteristics that might be shared by successful projects. My expectations were that successful characteristics would be targeted toward specific private-sector firms, would remove bottlenecks to growth, and would target areas with high economic development potential. I also thought that successful projects would tend to be in areas that were growing in terms of population and employment during the time of project implementation. My expectations were to some extent borne out by the data; however, the results were insufficient to identify causal factors leading to successful projects.

Many projects at all success levels were targeted at a specific business or businesses; targeting a specific business was not in itself a distinguishing feature of successful projects. Successful projects were distinguished from other projects by more clearly articulated strategies for achieving their economic development goals with the infrastructure improvements the projects were making. The projects that removed bottlenecks to growth and/or targeted areas with high economic development potential (though there were few of them) were among the most successful projects; these projects also tended to be guided by clear strategies.

The results showed that total employment and population growth during the period of project implementation were higher in the areas with highly successful projects. It may be that the projects that are able to target large firms or remove constraints to economic growth occur in areas that are already growing in population and employment. These areas are experiencing pressures to grow which the infrastructure projects may accomodate. It is possible that growth trends in an area could be used as a predictive factor in project success; however, the results of this analysis are not strong enough to draw this conclusion.

However, when I looked at employment growth by industrial sector, there were no clear trends. This may indicate that employment growth in a particular sector is less important than the fact that employment is growing overall, in conjunction with population growth. It is this that increases the market size and spending power in an area (though to determine for certain whether spending power is increasing we would have to know whether the jobs resulting from projects were full- or part-time, and what was happening to wage rates during the same period). The increasing market size, in turn, makes the area attractive to many types of businesses.

The results also showed that, in general, exclusive water/sewer projects tend to be more successful than exclusive access-road projects, regardless of the scale of the project. It is possible that there is a natural progression in which infrastructure serves an area and prepares it for economic development. Access is an initial need, followed by site preparation and finally utility service to a site. More research is needed into this possibility.

Further Research

This paper has served as a first step to show the type of inquiry that is needed to clarify what factors influence the economic outcomes of infrastructure projects. The results point to some factors that may be associated with high employment impacts of infrastructure projects, but further research is needed to determine how important these factors are and to obtain more conclusive results. I focused on a limited number of projects in a relatively focused geographical region, for the purpose of eliminating possible large variations in project success levels and characteristics due to regional economic and geographical characteristics. Analysts in further studies should use larger data sets and more extensive economic analysis, and they should design interviews with the focus of obtaining information that will help identify the reasons behind project outcomes.

There are several ways in which this sort of study could be improved to yield more informative and perhaps more conclusive results. First, interviews should be designed and conducted with the aim of identifying what made each project successful. Information should be gathered on the economic development needs of the area, the strategy that the area has for fulfilling these needs, and how the given project fit into that strategy. More extensive information should be sought on what firms were targeted by the project, whether those firms were new branches of existing firms, start-ups, or were relocating from another area (and if so, from where were they relocating), and what the relationship was between the project and the private sector activity. Information should also be obtained on the economic base of each project area and how the private sector activity or activities targeted by the project related to the area's economic base.

Future analysts should also use more detailed employment data, as well as data on the types of establishments in the area. Examining employment trends at a more detailed sectoral level would make it possible to see more precisely what industries were growing or declining in the area while the project was being implemented. However, looking at employment trends at the two-digit SIC level, as in this paper, is too broad to yield any useful information.

It may be that successful projects tended to be in areas that were experiencing employment growth in the sector or in sectors related to that targeted by the projects. Another possibility is that areas might be experiencing employment growth in basic sectors, and that the success of the project stemmed in part from its targeting a growing basic sector or a sector, such as retail, that would benefit from overall income growth in the area.

I examined employment trends because I consider them to be a good indicator of economic development in an area; however, in a future analysis, analysts should also examine income growth, since businesses are attracted to an area by the size and spending power of its market, and that depends not only on the number of persons employed but also on their income levels. The employment data used for this study were from the Bureau of Labor Statistics, which does not distinguish between full- and part-time jobs. Future analysts should use data that does make this distinction, because if part-time jobs are increasing in an area, this may offset an overall increase in the number of jobs available. They should also examine wage information to see whether wage levels are rising with employment, or whether pay cuts are offsetting increases in employment opportunities. They should collect more detailed wage data in interviews, to know what the companies that are being targeted by the project

pay their employees. It would also be helpful to know from where the employees that take up the new jobs that projects make available are coming, what level of skills the jobs created require, and so on. Thus, it may be a good idea to analyze data on where residents work and on commuting patterns both in and out of the area.

An issue that future evaluations should be sensitive to is that of attribution of economic impacts to the projects analyzed. Most evaluations deal with the question of how important was the agency's funding, and to what extent the economic impacts assumed to result from a project can be attributed to the funding provided by that agency. However they tend not to answer the question of how important is any public funding? How do we know that impacts would not have happened anyway without the projects? An investigation of this question would require, among other things, more in-depth discussion with private-sector representatives.

Appendix A
Selected Factors Associated with Project Impacts

Small Project	Rank (Total Number of Jobs)	Targeted specific businesses?		Targeted specific industry?		Targeted area with high economic development potential	number of businesses served		removed bottlenecks to growth	comments
		location (new)	expansion (retained)	new	retained		new	retained		
Vista Industrial Center Water and Sewer	1	x					8			total of 8 firms have been attracted to the site
Lumpkin County Industrial Park Water and Sewer Improvements	2		x			x	26			
Hornell Commercial Center Water and Sewer Extension	3	x					several			enabled large shopping center anchored by WalMart and Wegmans (grocery store)
Fox-Shannon Industrial Park Improvements	4	x					1			intended to serve UPS; instead recruited new prison to the site
Highway 32 Industrial Park	5						1			unspecified projections; new automotive plant
Ecru Industrial Park Improvements	6	x	x				1	2		facilitated expansion of one firm and location of another
Cambria County Industrial Park Infrastructure	7	x	x				several	several		some expected firms failed; others started up or expanded
Hayesville Water and Sewer Improvements	8	x					5			hospital originally targeted; a few other small to medium sales and services businesses also located

Appendix A
Selected Factors Associated with Project Impacts

Small Project	Rank (Total Number of Jobs)	Targeted specific businesses?		Targeted specific industry?		Targeted area with high economic development potential	number of businesses served		removed bottlenecks to growth	comments
		location (new)	expansion (retained)	new	retained		new	retained		
Marietta Food-4-Less Access Road	9		x					1		enabled grocery store to expand
Fulton MS Industrial Road	10		x					3		served three existing wood products firms
Gamaliel Wastewater System	11		x				4	1		expansion smaller than anticipated; 4 new firms
Hiawasee Sewer System Improvements	12	x					1			enabled development of resort at site of annual state fair
Lee MS-Bryce-Toga Industrial Access Road	13	x					1			one manufacturing plant served; few jobs
NN Ball & Roller Co.	14	x					1			manufacturing firm helped diversify economy
Tishomingo County / Midway Access Road	15		x					2		retained limestone quarry important for construction industry
Marion Smith Industrial Access Road	16	x		x			1			wood industry targeted; new mill employs very few
Clay / Leslie Industrial Park Expansion	17									no businesses attracted yet
Package Corporation of America's Utility Pole Mill Access Road	18		x	x						firm expanded then closed

Appendix A
Selected Factors Associated with Project Impacts

Medium-Scale Project	Rank (Total Number of Jobs)	Targeted specific businesses?		Targeted specific industry?		Targeted area with high economic development potential	number of businesses served		removed bottleneck to growth	comments
		new	retained	new	retained		new	retained		
Cullman Infrastructure Improvements	1	x	x			x	at least 2	8		intended to facilitate retail development with WalMart and grocery store and expansion of existing businesses
Kings Point Water Line Extension	2	x		mining			1			enabled investment by large new underground mine
Turner Industrial Park Access Road	3	x					3			expected to enable establishment of furniture operation; three manufacturing firms located incl. wood and plastic industries
Rutledge Wastewater Treatment	4						3	58	x	expanded wastewater system which was not up to standards and was constraining growth
Eason Blvd. Intersection Improvements	5							9	x	removed bottleneck in most industrialized part of area
Jasper Veriform Industrial Location	6	x					5		x	private investment of manufacturing firm contingent on improvements
Benton Water System	7						5		x	prior system did not comply with state standards and inhibited growth
Barment Industries Sewer Extension	8		x					1		large and expanding aluminum manufacturing firm that recently won a contract from a major auto manufacturer
Hanceville Industrial Park	9	x	x				1	1		project necessary to attract new chip board plant (wood industry)
Toccoa Industrial Park Water/Sewer Lines	10						6			area had lost prospects before because of lack of industrial sites; several metal processing firms located

Appendix A
Selected Factors Associated with Project Impacts

Medium-Scale Project	Rank (Total Number of Jobs)	Targeted specific businesses?		Targeted specific industry?		Targeted area with high economic development potential	number of businesses served		removed bottleneck to growth	comments
		new	retained	new	retained		new	retained		
Winfield Sewer Extension	11	x					11	1		to serve proposed saw mill and planned retail development ; new businesses in services and retail
Coley Road Improvements	12				furniture					supported traditional and largest regional industry (furniture)
Rockcastle Industrial Park	13						1			part of development of industrial park designed to attract industry
Russell Springs Sewer Extension	14						2			2 small new businesses, but benefits of project blunted by area's recent economic troubles
Northeast MS Industrial Park Water Facility - Phase I	15									in conjunction with other projects, expected to make the area favorable for industrial expansion; attracted two businesses but one expanded out of project area and the other went out of business

Appendix A
Selected Factors Associated with Project Impacts

Large Project	Rank (Total Number of Jobs)	Targeted specific businesses?		Targeted specific industry?		Targeted area with high economic development potential	number of businesses served		removed bottlenecks to growth	comments
		new	retained	new	retained		new	retained		
Benedum Airport - Air Center Project	1			aerospace			several			facilitated aerospace-focused industrial development (which was a strategic goal of the area and a part of their efforts at economic diversification)
Boyd Rural Sanitary Sewer System	2					x	28	several	x	removed bottlenecks impeding economic development in area regarded as economic backbone for the future development of the county
Clermont County Industrial Access Road	3		x					1		served high-tech office/industrial park: firm initially targeted closed; another (software engineering) took over the site and expanded
Powell County Water Treatment Plant	4									specific impacts not specified; project supported area in new role as bedroom community
McDowell County Water and Sewer Extension	5	x					3			served a planned new prison and new auto parts manufacturing firm
Union County / New Albany Water-Sewer	6	x					1			Wal-Mart Distribution center contingent on improvements
Arley Water System Improvements	7		x					3		three companies enabled to expand
Demorest Water System Improvements	8	x	x			x	1	2		new paper products firm; expanded state prison and egg laying operation
East Muskingum Water System Expansion	9		x					1		facilitated expansion of major bakery
Gardner / Turnpike Industrial Water and Sewer	10					x	2	4		served institutional and manufacturing developments

Appendix A
Selected Factors Associated with Project Impacts

Large Project	Rank (Total Number of Jobs)	Targeted specific businesses?		Targeted specific industry?		Targeted area with high economic development potential	number of businesses served		removed bottlenecks to growth	comments
		new	retained	new	retained		new	retained		
Allegheny Particleboard Industrial Park	11	x			x		1	2		wood products industries targeted
Winchester / Clark County Industrial Park	12	x					14			project initially anticipated two firms; ultimately 14, mostly manufacturing
Slate Creek Industrial Site	13						2			two call centers
Alcorn County South Industrial Park Improvements	14	x					2			two small firms anticipated; manufacturing and furniture wholesale firms located
Cattaraugus Economic Development Zone Infrastructure	15									road between two towns; 18 private sector projects since this project completed
Dickenson County Industrial Development Project	16							1		helped attract new call center
Marienville Sewage Improvements	17	x			x		2			wood products businesses targeted; one has since failed
Columbus – Lowndes County Riverside Industrial Park Access	18						2	1		emphasis of project seems to have been on securing port access
Blount Mountain Water Extension	19						1	several		intended to stimulate agricultural activity

Source: EDRG and author's calculations based on data from EDRG

Appendix B
Population and Employment Growth In Project Counties

Small Project	Rank	State	County	Start – End Year	Population Growth (%)	Change in Employment (%)									
						Total	Agriculture	Mining	Construction	Manufacturing	Transport /Utilities	Whole-sale	Retail	FIRE	Ser-vices
Vista Industrial Center Water and Sewer	1	NC	Buncombe	1993-1993	4.8	11.3	8.8	13.0	29.6	1.8	4.2	30.3	9.9	-2.9	16.5
Lumpkin County Industrial Park Water and Sewer Improvements	2	GA	Lumpkin	1992-1993	10.5	34.7	0.0	0.0	100.0	70.0	23.1	11.1	38.5	29.4	40.0
Hornell Commercial Center Water and Sewer Extension	3	NY	Stueben	1992-1993	-0.2	-4.9	2.7	-19.0	-21.3	-18.2	12.6	40.3	-1.6	8.3	8.6
Fox-Shannon Industrial Park Improvements	4	OH	Belmont	1990-1991	-2.1	11.0	4.9	-24.7	-0.8	-8.3	4.1	12.0	9.0	50.2	26.3
Highway 32 Industrial Park	5	KY	Rowan	1995-1996	4.1	16.1	0.0	-81.8	64.1	15.3	29.5	47.3	19.0	-9.3	10.0
Ecru Industrial Park Improvements	6	MS	Pontotoc	1991-1992	6.1	-2.2	-70.0	n/a	-49.8	-9.2	12.1	5.7	32.8	2.9	46.3
Cambria County Industrial Park Infrastructure	7	PA	Cambria	1993-1994	-2.3	0.1	21.1	-71.5	12.6	-3.7	-21.2	3.0	5.0	-9.1	11.6
Hayesville Water and Sewer Improvements	8	NC	Clay	1994-1995	10.9	10.2	0.0	n/a	13.5	-39.5	0.0	0.0	34.5	-21.4	69.7
Marietta Food-4-Less Access Road	9	OH	Washington	1992-1994	2.6	13.8	16.5	9.4	13.0	4.8	28.0	10.0	15.0	-8.8	24.5
Fulton MS Industrial Road	10	MS	Itawamba	1993-1995	4.6	6.5	0.0	N/A	85.2	-30.5	-16.4	51.9	46.4	2.9	23.1
Gamaliel Wastewater System	11	KY	Monroe	1992-1993	0.8	13.2	0.0	n/a	0.0	4.3	-1.8	5.5	1.2	1.3	132.9
Hiawasee Sewer System Improvements	12	GA	Towns	1992-1993	11.1	55.9	0.0	0.0	10.5	12.0	55.1	100.0	56.2	55.4	105.9

Appendix B
Population and Employment Growth In Project Counties

Small Project	Rank	State	County	Start – End Year	Population Growth (%)	Change in Employment (%)									
						Total	Agriculture	Mining	Construction	Manufacturing	Transport /Utilities	Whole-sale	Retail	FIRE	Ser-vices
Lee MS-Bryce-Toga Industrial Access Road	13	MS	Lee	1994-1995	5.7	14.8	25.8	0.0	3.1	8.1	3.4	-4.2	22.9	16.2	28.6
NN Ball & Roller Co.	14	TN	Johnson	1995-1996	3.2	-12.6	0.0	n/a	16.9	-25.2	48.0	-22.1	25.2	13.6	-21.0
Tishomingo County / Midway Access Road: Phases 1 & 2	15	MS	Tishomingo	1990-1995	4.9	33.6	100.0	0.0	-14.1	37.2	66.7	186.2	8.5	98.4	20.5
Marion Smith Industrial Access Road	16	MS	Choctaw	1991-1992	-1.5	-16.3	n/a	n/a	-75.2	-29.8	90.0	150.0	-11.3	-11.1	42.4
Clay / Leslie Industrial Park Expansion	17	MS	Choctaw	1994-1995	2.7	12.7	n/a	n/a	190.0	1.3	11.3	65.2	11.5	-22.5	22.8
Package Corporation of America's Utility Pole Mill Access Road	18	KY	Clay	1996-1996	0.9	3.6	0.0	-97.3	-6.0	8.8	0.6	33.3	21.7	-13.7	30.9

Appendix B
Population and Employment Growth In Project Counties

Medium-Scale Project	Rank	State	County	Start - End Year	Population Growth (%)	Change in Employment (%)									
						Total	Agriculture	Mining	Construction	Manufacturing	Transport/ Utilities	Wholesale	Retail	FIRE	Services
Cullman Infrastructure Improvements	1	AL	Cullman	1990-1991	5.1	3.0	143.1	0.0	1.6	-19.4	1.2	9.5	17.8	5.9	32.5
Kings Point Water Line Extension	2	AL	Jefferson	1992-1993	2.1	7.4	33.0	-29.7	-19.0	4.2	-5.3	1.4	26.1	1.5	13.9
Turner Industrial Park Access Road	3	MS	Lee	1991-1994	11.0	31.4	55.4	n/a	17.7	22.9	19.6	-3.4	37.2	24.1	61.5
Rutledge Wastewater Treatment	4	TN	Grainger	1992-1994	9.1	17.4	70.0	300.0	86.9	8.1	300.0	-41.1	37.2	0.0	11.5
Eason Blvd. Intersection Improvements	5	MS	Lee	1991-1993	9.7	25.2	97.6	n/a	24.3	19.7	10.9	0.8	31.0	8.6	45.0
Jasper Veriform Industrial Location	6	TN	Marion	1992-1993	4.7	16.6	n/a	-43.9	94.1	17.1	-9.1	-9.7	13.9	-5.8	36.4
Benton Water System	7	TN	Polk	1992-1993	4.2	20.2	-80.0	0.0	-94.7	22.1	9.3	-43.8	62.8	267.-1	24.1
Barment Industries Sewer Extension	8	OH	Tuscarawas	1991-1992	2.8	8.6	-22.0	-8.5	1.7	3.4	3.1	12.7	6.2	18.0	21.6
Hanceville Industrial Park	9	AL	Cullman	1990-1992	6.6	6.3	143.1	-65.7	5.8	-10.3	20.0	8.0	14.0	3.7	35.2
Toccoa Industrial Park Water/Sewer Lines	10	GA	Stephens	1991-1992	5.0	2.9	100.0	0.0	-28.4	-9.5	-34.9	-41.1	8.8	-3.2	53.9
Winfield Sewer Extension	11	WV	Putnam	1992-1993	10.1	36.4	243.1	-65.7	58.1	116.4	46.1	63.7	20.9	6.4	21.7
Coley Road Improvements	12	MS	Lee	1992-1994	8.9	30.1	53.6	0.0	17.4	26.2	25.2	6.6	33.0	18.9	46.2
Rockcastle Industrial Park	13	KY	Rockcastle	1994-1995	3.3	14.0	0.0	0.0	54.4	-5.1	23.6	15.7	1.6	41.3	34.6
Russell Springs Sewer Extension	14	KY	Russell	1992-1994	8.1	-0.3	n/a	n/a	7.7	-31.3	76.8	215.0	70.0	4.8	84.0
Northeast MS Industrial Park Water Facility	15	MS	Tishomingo	1992-1993	2.1	11.3	0.0	0.0	106.2	-0.2	24.2	156.3	-3.6	19.3	55.3

Appendix B
Population and Employment Growth In Project Counties

Large Project	Rank	State	County	Start - End Year	Population Growth (%)	Change in Employment (%)									
						Total	Agriculture	Mining	Construction	Manufacturing	Transport/ Utilities	Wholesale	Retail	FIRE	Services
Benedum Airport – Air Center Project	1	WV	Harrison	1990-1993	0.3	14.8	105.4	-2.9	21.1	3.4	19.7	44.3	7.3	-10.5	24.7
Boyd Rural Sanitary Sewer System Phase I	2	KY	Boyd	1991-1993	-1.5	-7.6	16.7	-75.9	-29.0	-29.0	-4.6	16.5	-2.7	-22.4	30.0
Clermont County Industrial Access Road	3	OH	Clermont	1983-1996	32.6	147.2	400.0	100.0	376.5	72.5	44.7	269.7	130.8	159.1	21-7.4
Powell County Water Treatment Plant	4	KY	Powell	1990-1994	6.5	52.8	n/a	-66.7	122.2	71.3	-15.8	655.6	2.3	22.4	69.8
McDowell County Water and Sewer Extension	5	NC	McDowell	1992-1993	4.0	7.4	215.8	-21.6	29.5	-1.0	138.4	-1.0	21.9	16.0	13.2
Union County / New Albany Water-Sewer	6	MS	Union	1996-1997	4.3	14.5	n/a	n/a	-2.2	0.6	52.1	0.4	62.3	25.9	2.5
Arley Water System Improvements	7	AL	Winston	1992-1993	6.0	42.1	n/a	n/a	-23.9	43.5	-0.7	81.2	24.4	70.9	13-8.5
Demorest Water System Improvements	8	GA	Habersham	1991-1996	14.9	16.9	73.9	0.0	61.8	-10.1	18.7	3.5	20.9	11.3	14-5.8
East Muskingum Water System Expansion	9	OH	Muskingum	1992-1994	2.6	12.6	81.4	-59.3	0.0	14.5	23.3	-24.7	17.1	18.8	21.9
Gardner / Turnpike Industrial Water and Sewer	10	WV	Mercer	1992-1993	-0.1	9.4	13.8	12.9	64.2	14.4	1.5	7.7	-0.7	-16.1	16.1
Allegheny Particleboard Industrial Park	11	PA	McKean	1990-1992	1.9	9.0	37.9	-31.4	30.8	6.0	31.9	-24.8	11.7	-3.8	19.5
Winchester / Clark County Industrial Park	12	KY	Clark	1992-1994	5.9	14.5	30.0	-75.0	-0.8	18.0	-2.9	58.9	14.0	-17.4	24.9
Slate Creek Industrial Site	13	VA	Buchanan	1992-1994	-5.4	-26.6	N/A	-48.0	0.3	49.1	-5.6	-26.4	3.4	-15.5	15.8
Alcorn County South Industrial Park Improvements	14	MS	Alcorn	1995-1996	0.1	-2.1	135.3	n/a	18.7	-16.7	14.1	37.7	10.2	-29.1	10.6
Cattaraugus Economic Development Zone Infrastructure	15	NY	Cattaraugus	1994-1995	-0.6	3.6	9.2	26.2	24.2	-2.0	-3.8	4.3	21.0	-3.2	-3.8

Appendix B
Population and Employment Growth In Project Counties

Large Project	Rank	State	County	Start - End Year	Population Growth (%)	Change in Employment (%)									
						Total	Agriculture	Mining	Construction	Manufacturing	Transport/ Utilities	Wholesale	Retail	FIRE	Services
Dickenson County Industrial Development Project	16	VA	Dickenson	1991-1992	0.4	-4.6	0.0	-22.6	18.5	9.2	59.1	0.0	-22.6	-12.6	32.5
Marienville Sewage Improvements	17	PA	Forest	1989-1991	7.2	39.1	n/a	-73.7	25.0	121.1	-53.6	0.0	17.3	110.0	17.9
Columbus - Lowndes County Riverside Industrial Park Access	18	MS	Lowndes	1987-1992	0.8	25.9	-22.5	480.0	1.3	22.6	113.3	57.2	21.2	14.7	84.8
Blount Mountain Water Extension	19	AL	Blount / St. Clair	1991-1992	8.8	30.1	n/a	n/a	109.0	15.4	31.6	-13.1	35.3	19.2	57.6

Source: EDRG and author's calculations based on data from EDRG

Bibliography

Bingham, Richard D., and William M. Bowen. 1994. "The Performance of State Economic Development Programs: An Impact Evaluation." Policy Studies Journal, Volume 22, Number 3, pp. 501-513.

Blair, John P. 1995. Local Economic Development: Analysis and Practice. Thousand Oaks: Sage Publications.

Bradshaw, Michael. The Appalachian Regional Commission: Twenty-Five Years of Government Policy. University Press of Kentucky, 1992

Brandow Company and Economic Development Research Group. 2000. Evaluation of ARC's Infrastructure and Public Works Program. Appalachian Regional Commission, Washington, DC.

Currea, Dora P., and Karen R. Polenske. 1985. "Planning for Public Infrastructure Investment," in Economic Faces of the Building Sector, edited by Snickars, F., B. Johansson, and T.R. Lakshmanan, editors. Stockholm, Sweden: Swedish Council for Building Research.

Horan, Thomas A., and Jonathan L. Gifford. 1993. "New Dimensions in Infrastructure Evaluation: The Case of Non-Technical Issues in Intelligent Vehicle-Highway Systems." Policy Studies Journal, Volume 21, Number 2, pp. 347-356.

Jenkins, Glenn P. 1997. "Project Analysis and the World Bank." The American Economic Review. Volume 87 (May), pp. 38-42.

Isserman, Andrew, and Terance Rephann. 1995. "The Economic Effects Of The Appalachian Regional Commission: An Empirical Assessment Of 26 Years Of Regional Development Planning." Journal of the American Planning Association Volume 61 (Summer), pp. 345-364.

Mt. Auburn Associates. 1992. Evaluation of the U.S. Economic Development Administration's Public Works Program.

Rainer, George. 1990. Understanding Infrastructure: A Guide for Architects and Planners. New York: John Wiley & Sons, Inc..

Rockler, Nicholas O. February 2000. Regional Economic Performance and Public Infrastructure Investment. PhD Dissertation. Department of Urban Studies and Planning, Massachusetts Institute of Technology, Cambrdige, MA.

White, Jesse. 1998. Lecture to MIT 11.952, "Geography of Globalization" class (October 21).